School Shop

vol. XIX no. 9

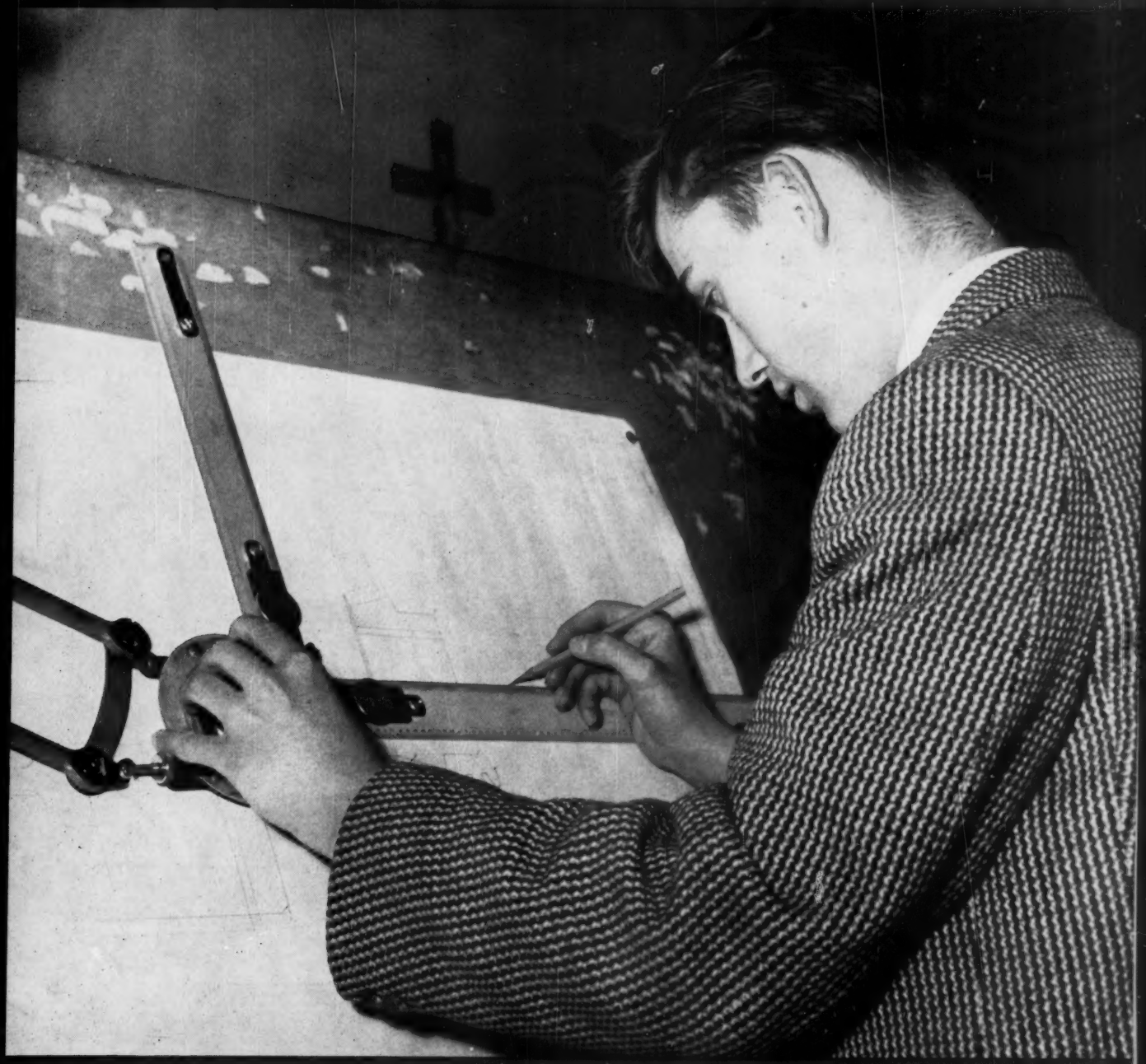
MAY 1960

Trade and Technical Education in Europe
by Ralph C. Wenrich

Spark-Plug Diagnosis
by George R. Kinsler

Chemical Milling
By John E. DeWald

Cover Story: A drafting student in a Viennese technical school learning his skill with a drafting machine. For a complete, first-hand report on European trade and technical education, and some recommendations, please turn to page 9.



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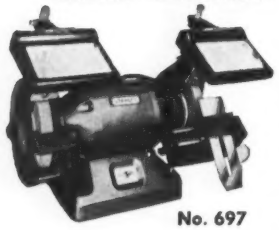

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

How to Get Better Teachers

I would be remiss if I neglected to preface this editorial by paying tribute to the many excellent services being rendered by most of our teachers in the field of industrial arts. However, it must be recognized that we do have a number of teachers who do not measure up to the high standards we would like to prevail in our area of education.

In most cases the responsibility for this situation lies within the province of our teachers colleges and schools of education. These institutions are frequently so engrossed in their efforts to build a large student enrolment that they tend to forget that it is difficult to produce a high-grade article if the material used is substandard. Frequently the requirements set up for admission are superficial and all that the students have to do to earn a certificate to teach is to behave themselves and earn a C grade.

When students are in college they are required to follow a well outlined course of study. Part of this curriculum is devoted to the theoretical aspects of industrial arts; the remainder deals with the various types of shop work offered in the department. In order to obtain a broad view of the field, they take courses in five or six different subjects. The result of this is that they gain a minimum knowledge of many shop areas, but very little of any one. The effect of this lack of knowledge in depth is apt to be embarrassing to the beginner when he appears before a class.

Another factor which appears too frequently in teacher-training institutions is that many of the professors, who are responsible for the shop courses, are limited in their experience in the subjects they teach. This tends to confine the material they present to the mere rudiments of the subject. Because they acquitted themselves with distinction in their college work they were considered to be desirable college teachers. When an opening developed on the college staff, the impressive record presented by the youth convinced the dean that this candidate would bring honor to the department. However, it is easy to imagine how ineffective such a person would be when faced with the problem of directing students how to keep 30 pupils constructively busy.

In addition, the theoretical phases of the curriculum are presented at a time when their relationship to the process of teaching are meaningless to the students because of their lack of experience in teaching. Since the knowledge acquired in these theory classes is important to teachers, they might be more effective if they were delayed until the young teacher developed an understanding of their significance in their work. They would then be in a position to recognize their value as an aid in dealing with the problems that arise in their teaching.

Another factor which contributes to the employment of substandard teachers may be traced to the certification system in vogue in most of our states. While the granting of a teacher's certificate is frequently the responsibility of the state department of public instruction, it is customary for this body to act on the recommendation of the teachers colleges. This means that the professors who train the teachers actually control the certification of those they train. What would happen to our intricate modern machinery if the person who made each part were permitted to pass judgment on its accuracy?

If industrial-arts teachers hope to attain the professional status to which they are entitled, they must follow the example of doctors, dentists, and even plumbers, who permit individuals to practice their professions on the basis of an examination given, not by the colleges, but by a body representing the profession the applicant wishes to join.

This means that those who are now in the profession must agree on certain minimum standards which they believe to be reasonable. Then the question of whether or not a candidate is accepted should depend on the judgment of a group which represents the profession. — *T. D.*

David Huttner

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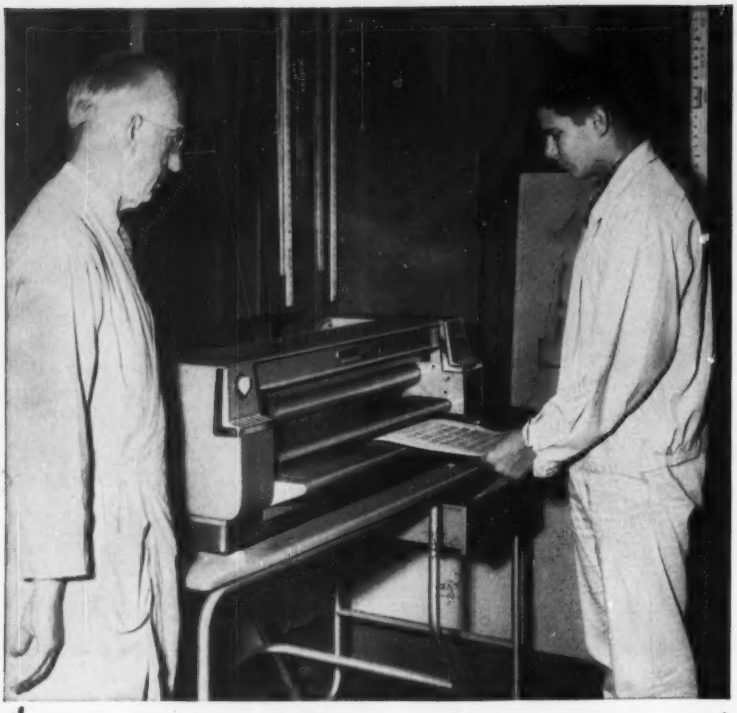

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IN THE MORNING MAIL...

(Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sir:

I, too, am in favor of the idea passed on to you by R. H. Snow in his letter to the editor in the January issue of SCHOOL SHOP. It would be a fine thing for the cartoons to be on a separate sheet, or even put up later on in book form, like the "Diamond Dust" book.

As teachers, we can't stress education too strongly for our pupils, especially with things as they are in the world today.

John Hartig,
Mogadore, Ohio

Dear Sir:

It was with interest that I read Ira Johnson's article on the "Co_2 Process" on page 20 in the March issue of SCHOOL SHOP. It seems to me, however, that in an educational journal you should include in addition to the proprietary name, Stinex, an explanation that this material is basically nothing more than sodium silicate.

Gilbert S. Schaller,
University of Washington,
Department of Mechanical Engineering,
Seattle, Wash.

Dear Sir:

I enjoy reading SCHOOL SHOP very much. I think the articles are good and the project ideas a great help. Keep up the fine work.

Thomas Polite,
South Side High School,
Fort Wayne, Ind.

Dear Sir:

. . . All of our vocational and industrial-arts personnel enjoy receiving SCHOOL SHOP and make very favorable comments about it. We are especially appreciative of the "News from Washington" column that appears in the back of each issue. Please make our appreciation known to Mr. Paca . . .

Merle W. Bodine,
State Supervisor,
Trade and Industrial Education,
Topeka, Kan.

Dear Sir:

I want you to know that I think SCHOOL SHOP is the best magazine published for shop teachers. Never a month goes by that I don't receive valuable help. The October issue is extremely valuable with its teaching aids section . . . Keep up the good work. It is invaluable to all shop teachers.

Herbert N. McCulley,
West High School,
Waterloo, Ia.

Dear Sir:

Mr. P. S. Waldeck, our state supervisor for industrial-arts education, has many wonderful comments to make about your magazine. To use his exact words, "No good industrial-arts department is without SCHOOL SHOP magazine." We want to have a good industrial-arts department.

Edgar M. Cobett,
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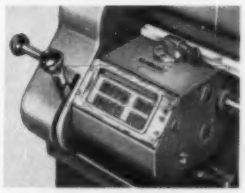

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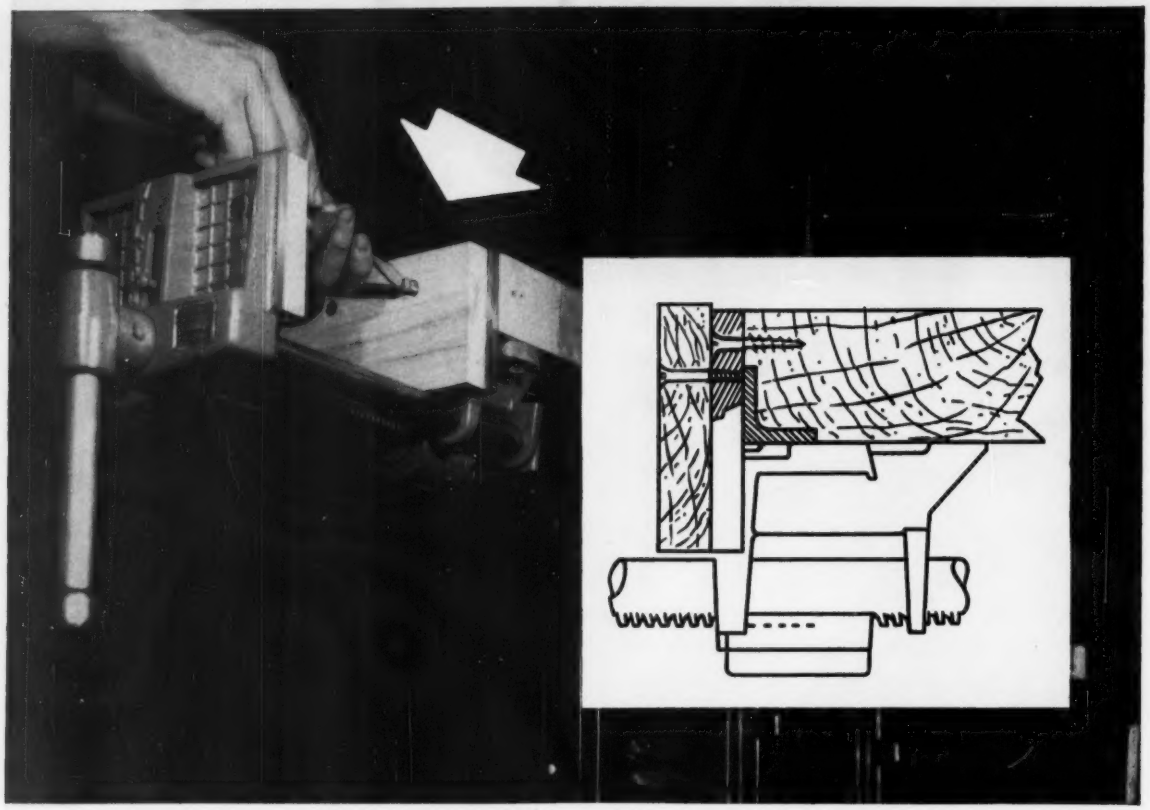

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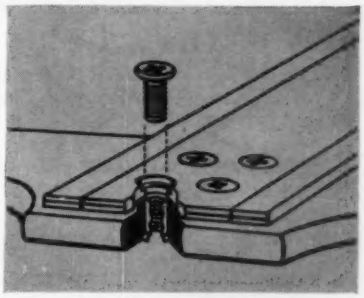

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Trade and Technical Education in Europe

By Ralph C. Wenrich

Professor of Vocational Education and Practical Arts, University of Michigan, Ann Arbor

VOCATIONAL-industrial education in full-time trade and technical schools in Europe is generally superior to that provided for youth in the United States. This is my considered opinion based on an intensive six-month study in Europe of trade and technical schools.

Let's take a look at the organization of schools in Austria which is somewhat typical of European countries. Most children in Austria attend a common elementary school for four years. Those children who demonstrate a high degree of intellectual ability during the four-year elementary-school program are given the opportunity to attend a grammar school where for the next eight years they receive a classical education which prepares them to enter any European university. The percentage of youth admitted to the grammar school is relatively small—seldom more than 10 percent of any age group. Those not admitted to the grammar school continue their education for four more years in either the upper division of the elementary school, or in middle schools, which in many respects are similar to our junior-high schools.

Most youth terminate their full-time schooling after the completion of eight years of general education. There is, however, another possibility available to about 10 percent of these youth—to continue their education for two to five years in a trade or technical school. These full-time, special schools can be and are quite selective because they generally have two or three times as many applicants as can be admitted.

Although I visited many part-time trade schools, I was most impressed by the quality of excellence in trade and technical programs provided in full-time specialized schools devoted to the preparation of youth of secondary-school age and older for careers in industry. Let's examine a number of factors which I believe contribute to this quality. Let's also consider possible implications for programs in the United States.

1. Trade and technical education is usually provided in specialized schools with a single purpose. Each school is headed by a director (or principal) who is a qualified worker in the area for which training in that particular school is provided. Trade and technical programs in the United States, especially those found in comprehensive high schools, do not have this same type of direct administrative and supervisory leadership. Might it not be possible and desirable to organize our comprehensive high schools in such a way that the trade and technical programs would be under the direct supervision of personnel who understand this kind of education and can give it dynamic leadership?

2. Trade and technical education in European countries is more thorough, intensive, and rigorous than it is in the United States. Specalized schools in Europe have no need to compromise between general education and vocational objectives. Because the purpose is clearly vocational, both teachers and students work at this task with a clear objective and a determination to achieve it. The school day, the school week, and the school year are longer than they are in the United States. Might our programs not be strengthened by clarifying our goals and extending the school day to at least six hours, and the school year to eleven months?

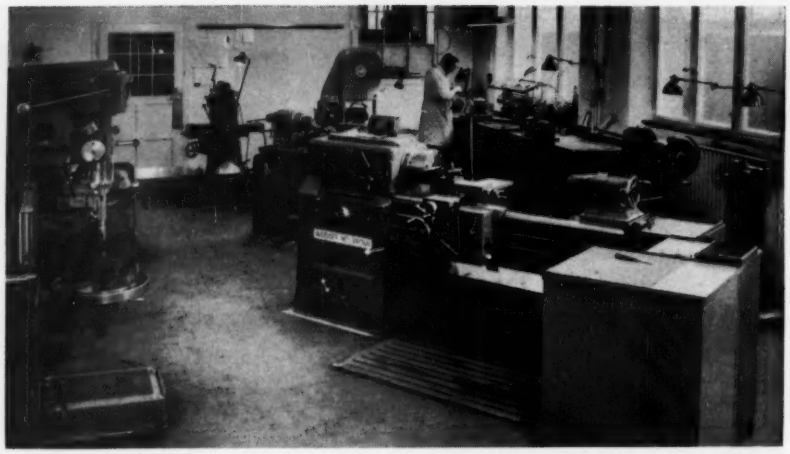
3. Competition on the part of secondary-school-age youth for admis-

"Specialized schools in Europe have no need to compromise between general education and vocational objectives. Because the purpose is clearly vocational, both teachers and students work at this task with a clear objective and a determination to achieve it." Below a drawing class pursues these objectives in the Rheinische Ingenieurschule at Bingem am Rhein, Germany. Admittance is competitive. The River Rhine can be seen through the windows.

sion to trade and technical schools in Europe is generally keen. Only those best able to profit from the instruction are admitted. Before any youth is admitted, he must show interest and aptitude for the trade or technical occupation which he will study. In the United States, many vocational-industrial programs are made ineffective by using them as "dumping grounds." Might we not develop valid criterions for the selection of students to be admitted to vocational programs, and then refuse to admit those who do not have the aptitudes necessary for success in the particular occupation?

4. The general education of students in European trade and technical schools is not neglected. Although they are intent on giving youth in these schools a thorough vocational preparation, recognition is given to the fact that the whole child must be educated. Increasing attention is being given to the civic and social development of the child. In the United States, we have given so much attention to the general education of high-school youth that we neglect the development of the individual's special talents and interests. Should we not give increasing attention and allocate a larger proportion of the student's time to his specialized preparation for a vocation?

5. European trade and technical schools are generally tied in rather closely with business and industrial organizations. This is done through the use of advisory committees, and in a few cases the ministry of education operates schools in cooperation with trade associations. For example, the day I visited the school for sawmill operators, the lumbermen's association of Austria was meeting at the school. They are cosponsors of this particular institution.



"European trade and technical schools have facilities which provide an environment comparable to that found in industry." Above: Main workshop at Staatliche Ingenieurschule, Esslingen am Neckar, Germany. The training is more thorough than in the United States.

European schools also maintain close relationship with graduates of their schools. A number of schools have a "society of friends of the school." Many of these "friends" are alumni, holding important positions in business and industry.

In the United States, we have long recognized the value of maintaining close relationships with business and industry, but too frequently we have neglected to work at this idea. Vocational-industrial education in the United States would be improved immeasurably if we used an advisory committee to help us plan and evaluate *each* specialized program. One junior college in California has an advisory committee for each vocational program—64 committees involving more than 500 community leaders! Should we not make an effort to duplicate this in all schools where specialized industrial programs are operated? Then too, why not organize alumni and others interested in our trade and industrial programs into associations of "friends"?

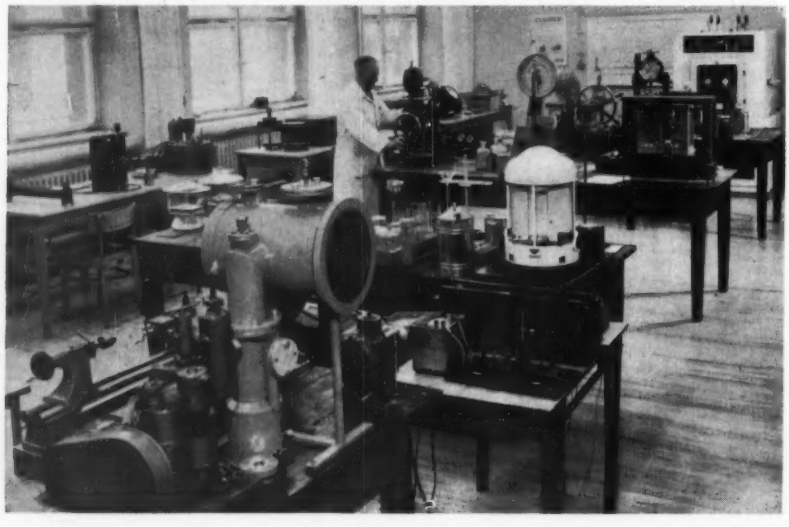
6. Trade and technical instructors in these specialized schools have a background of training and experience which makes them highly competent in the trade or technical occupations for which they provide instruction. It is not uncommon for instructors in these specialized schools to be engaged in research involving new materials and processes related to their occupations.

Trade and technical programs in the United States might be improved if we insisted on the same high standard of qualifications for instructors. At least, we should get rid of the idea held by many general school administrators that a person with no more industrial training and/or experience than that required to function as an industrial-arts teacher qualifies one to teach in a vocational-industrial program.

7. European trade and technical schools have facilities, including both buildings and equipment, which provide an environment comparable to that found in industry. Even in the face of post-war competition for funds to reconstruct their public buildings, Europeans are allocating a sizeable proportion of their resources to the construction of modern, specialized, trade and technical schools.

(*Continued on page* 21)

Below is a laboratory for testing insulating materials located in the Staatliche Ingenieurschule, Esslingen am Neckar, in Germany. Despite competition for funds schools have received a big share of what's available for the total post-war reconstruction effort.



For the general electricity teacher

House Wiring Panel

By Floyd H. Corl
Rock Falls, Illinois, Township High School

THIS aid will prove to be helpful to the general electricity teacher who is introducing a unit on residential house wiring.

The author has found that either an individual or small groups can work on a single panel, depending on the number of aids available.

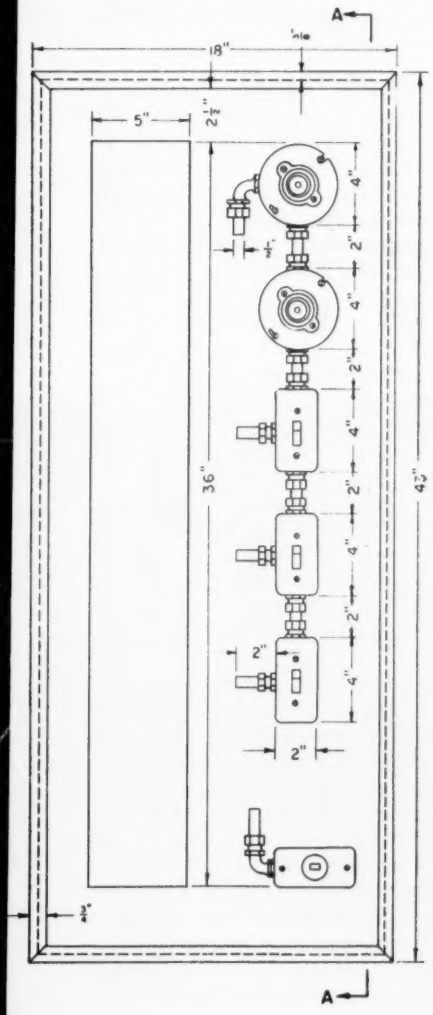
The teacher should begin by instructing the class in such things as sources of electric power for the home, distribution of electricity, wire size, wire splicing, soldering splices, taping, solderless connectors, and color codes. Students should also be introduced to the use of schematic and pictorial symbols used in electrical blueprints.

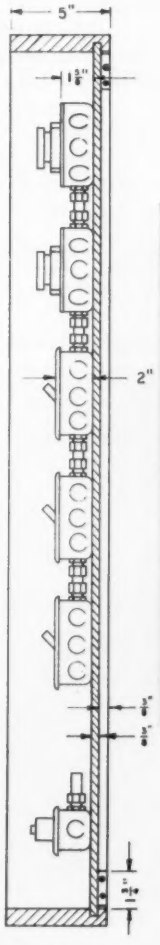
When the student is ready to start work on the panel, he should be shown how it is possible to select any one of 32 different circuit combinations, depending on the arrangement of single-pole switches, three-way switches, duplex outlets, and a four-way switch in the three 2″ x 2″ x 4″ handy boxes. Keep in mind that each combination can be fed at each of the five boxes.

He should next be required to draw his wiring diagram with colored chalk on the space provided opposite the boxes. He can use either schematic or pictorial symbols, whichever the instructor prefers. When the instructor has approved the drawing, the student should pull the necessary wires into the boxes, splice where necessary, and then ask the teacher to inspect his work before soldering or using solderless connectors. Following this, he should tape all joints and mount the various parts. The last step is to close up the boxes.

When the student has finished a combination, he should be required to completely disassemble his work with the exception of the boxes and the conduit, which should be left on the board. The exception to this would be in cases where the instructor requires the student to use flexible, metal-sheathed cable or nonmetallic, sheathed cable between the boxes instead of thin-wall conduit.

This aid cannot accomplish as much as a studding mock-up or on-the-job training, but for those of us who lack facilities or space, it gives students some operational experiences valuable from the standpoint of pre-trade or consumer appreciation.





SECTION AA

Bill of Materials

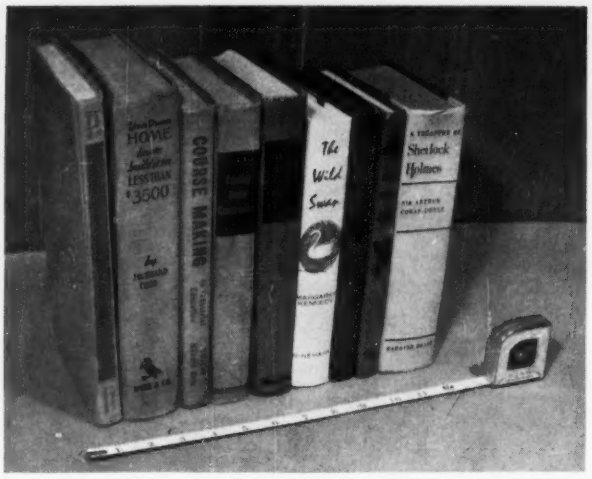
2 pcs.	¾″ x 5″ x 43″, clear white pine
2 pcs.	¾″ x 5″ x 18″, clear white pine
1 pc.	⅜″ x 17¼″ x 42¼″ plywood, GIS
4	¾″ x 1¾″ x 1¾″, inside corner irons
16	¾″ No. 6 fh wood screws
2	2″ right-angle screw hooks
1 pc.	3/32″ x 6″ x 36″ green chalk board, or equivalent.
1	4 oz. bottle of contact cement
1	Chalkboard eraser
	Yellow, white, red, and black chalk
2	4″ octagon boxes
2	4″ octagon-box, round coverplates with lamp sockets
2	120-v, low-wattage lamps
4	2″ x 2″ x 4″ handy boxes
12	3/16″ x ¾″ rh stove bolts, nuts, and flat washers
3	Handy-box switch cover plates (metal)
3	Handy-box duplex outlet cover plates (metal)
1	Handy-box cover plate with lamp socket
11	½″ thin-wall conduit connectors
2	½″ 90° thin-wall conduit connectors
9 pcs.	½″ x 1½″ thin-wall conduit
1	4-way switch
2	3-way switches
2	Single-pole switches
2	Duplex outlets
1	5-amp Minnibreaker
15′	16-2 rubber-covered cord
1	Clamp-type heavy-duty male plug
4′	2-wire parallel, rubber-covered wire
	Scrap pieces of No. 14 red, black, and white plastic-covered wire ★

Planned experiences leading to

Problem Solving and Designing

By George W. Ferns and Arthur D. Anderson

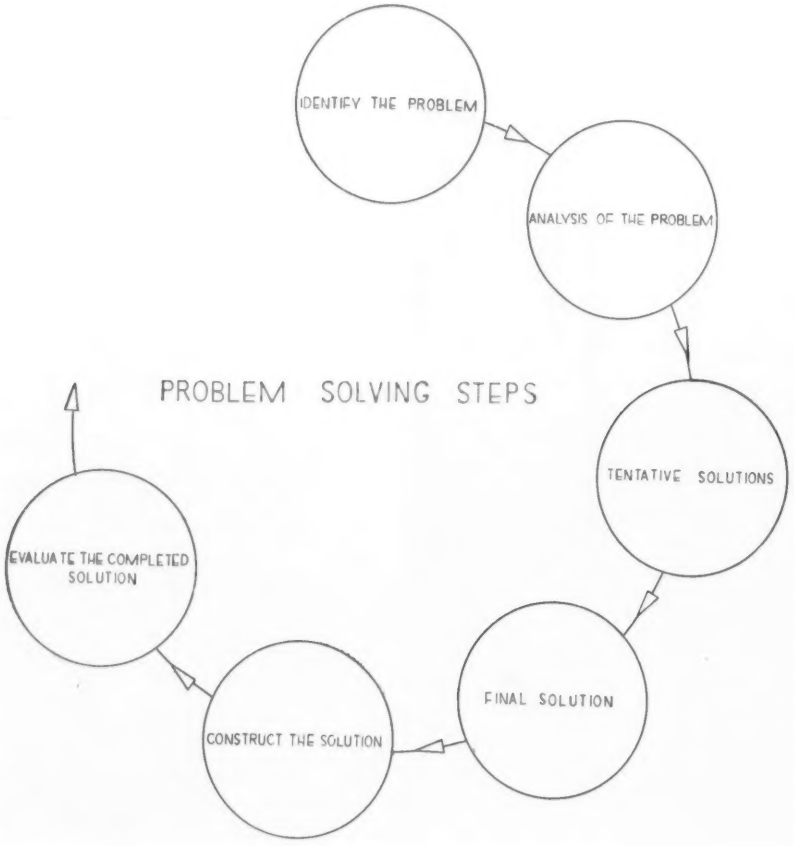
Department of Teacher Education, Michigan State University, East Lansing; and Whitman Junior-High School, Livonia, Michigan, respectively.



A first step in solving a problem of designing a book support is to take measurements. As obvious as this is, it comes first.

EVIDENCE of the need for problem solving is found everywhere in daily life. In the process of converting materials into articles which are functionally and esthetically satisfying, whether it is done in industry, school, or at home, the problem-solving process is a common denominator. Problem solving is carried on through industrial-arts activities in a variety of ways. A significant contribution can be made to this objective of general education because industrial-arts activities deal with concrete, two- and three-dimensional materials. To aid students in becoming more skilled in problem-solving ability is reason for giving much effort to devising more effective learning activities.

The purpose of this article is not to develop a rationale for inclusion of design and problem solving in industrial-arts objectives because much has already been said and written about this by others. Rather, it is an attempt to bridge the gap between theory and practice by sharing a specific teaching-learning activity with which the writers have experienced considerable success.



Identify the Problem

The class is confronted with a problem for which a solution is to be designed, constructed, and evaluated. The problem should be carefully planned by the teacher. In this case the problem with which the class is charged is "a table-top support, made primarily of wood, for books." Other examples of similarly planned problems are (1) "a frost and ice scraper, made of acrylic plastic, for automobile windshields," (2) "a serving dish made of fibreglass," (3) "a support, made of ceramic tile and wrought iron, for hot dishes."

Care must be taken not to use such words as "book ends, book shelf, book ramp" because they tend to stereotype and restrict students' thinking. The term "book support" frees the designer for a greater variety of solutions.

It is important that the class problem be carefully planned within limits by the teacher, particularly with beginning students and large classes, to insure a higher degree of success for students and teacher. To be considered here are objectives, experience and maturity of students, interests, teacher confidence, class size, limitations of physical facilities, reference resources, time, materials available, and cost. In a teacher-planned problem, where the solution is limited

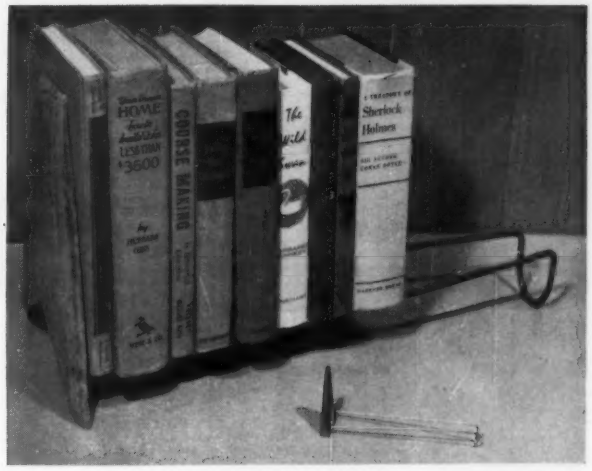
to certain materials, the variety of tool operations can be confined to a number which can be reasonably taught by the instructor. If the limit on materials and operations is too broad for a particular group there is apt to be a surplus of frustrating situations which tend to limit success and cause confusion. With more mature and experienced students the amount of planning is decreased, giving more freedom for creative solutions.

Develop Solutions to the Problem

Analysis. — The problem should be analyzed in terms of its function and its appearance: What should it do? What should it look like? The criterions (purposes, qualifications) for a successful table-top book support should be identified and listed through group discussion and/or analysis by individuals. A typical brainstorming session might be an appropriate activity for producing ideas. Some representative criterions that might be identified are:

1. The support should be stable.
2. The books should not topple.
3. It should be easy to move books in and out.
4. The book titles should be easily read.
5. It should hold *x* number and *x* size of books.
6. It should be easy to clean.
7. It should be structurally sound.
8. The cost should be reasonable.
9. It should use appropriate and available materials.
10. It should look pleasing in a particular setting.

At right is one completed solution to the problem. Shown, too, is a model. The completed book support is ready for evaluation.



11. It should be consistent with accepted principles of good esthetic design.[1]

Tentative Solutions

Efforts should be made by the individual and/or group to develop and collect several solutions for the problem. The ideas usually stem from three sources:

1. Solutions already in existence as can be found in homes, stores, catalogs, and project-idea collections.
2. Original creative "free-lance" thinking.
3. Combinations or modifications of these two.

To broaden the scope of possible solutions and to encourage more creative designs the instructor may show and discuss photos, sketches, illustrations, and three-dimensional models of existing solutions. Attention should be focused on their features in relation to the criterions adopted in the analysis.

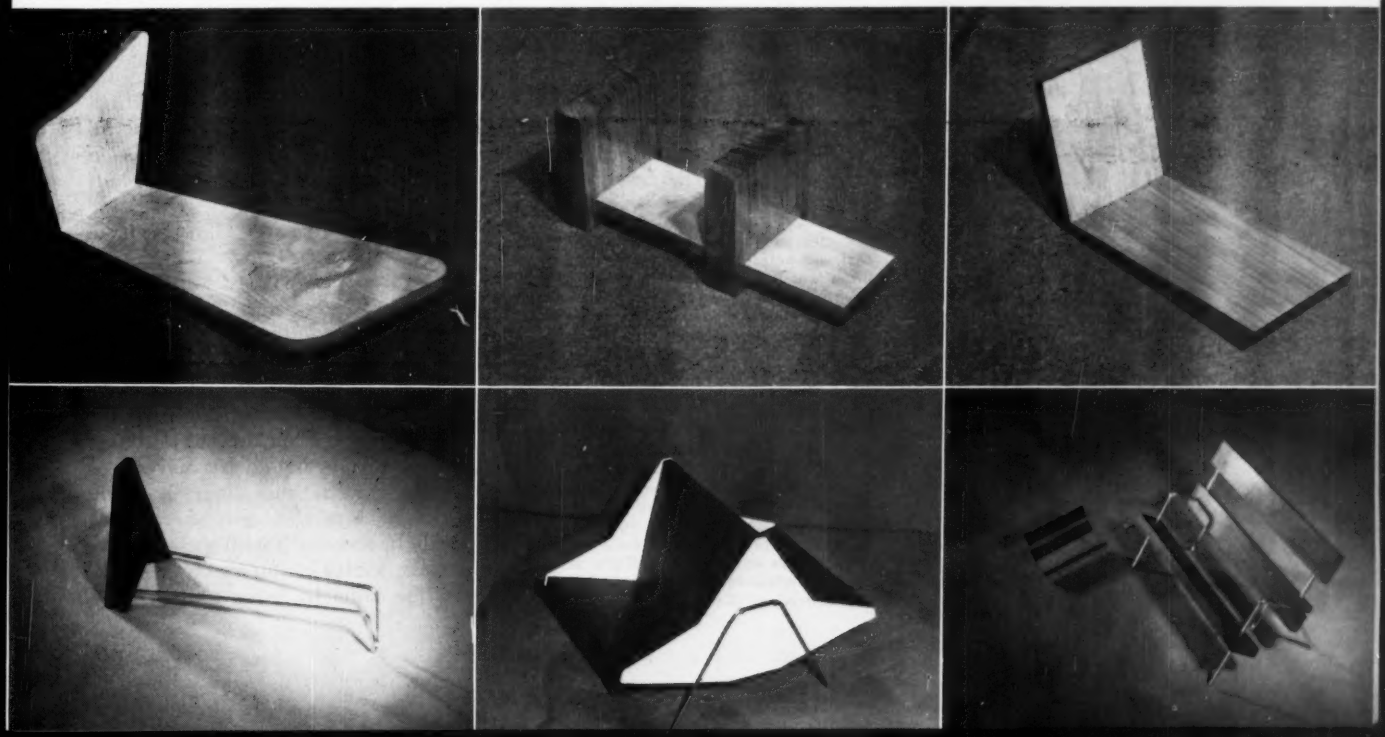
At this point in the problem, the student should individually or in groups develop tentative solutions through such activities as:

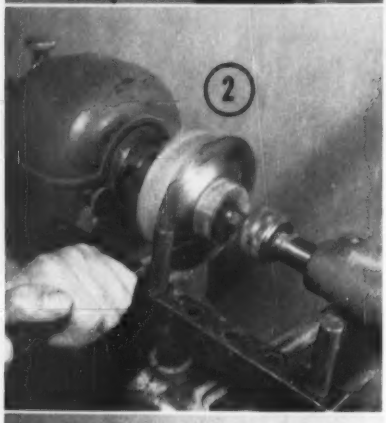
1. Looking at existing book supports at home.
2. Visiting stores which stock book supports and special catalogs.
3. Seek out book supports as they exist in other situations.
4. Sketch ideas as they develop.
5. Make scale models to test ideas.

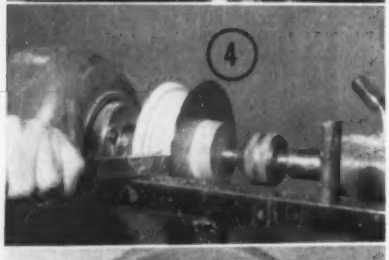
(*Continued on page* 42)

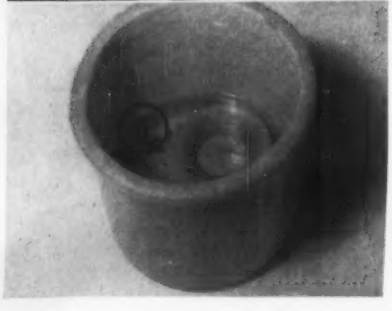
[1] *Styling the Looks of Things*, General Motors Corporation, Public Relations Department, Detroit, Mich.

Below are sample solutions to the book-support problem. These samples are: book ends, book ramps, or book troughs. Can you think of others?









Combinations are unlimited

Wood and Metal Meet in the Same Project

By C. Wayne Close
Glendale, Oregon, High School

CONTACT cements[1] have opened up many new horizons for craftsmen.

One of the new uses for this bonding material is combining metal and wood in the same project. Such projects, until now, required metal fasteners. Now, parts made of different materials can be joined rigidly and permanently together with these cements.

I have found that one of the most likely combinations is turned wood and spun metal. Spun-metal bases for bowls, trays, and wood serving plates are attractive. Wood bases for metal dishes and bowls are equally attractive.

A typical project, such as a turned wood bowl with spun-metal base, can be started by following the customary turning procedure for the bowl. It follows:

Bandsaw or jigsaw the blank for turning. Mount the faceplate on what will be the top of the bowl. Turn the back to shape. Carefully make the bottom flat. This is important so that there will be sufficient surface contact for good adhesion in the cementing process.

After the bottom is finished, mount the faceplate on it. Next, dish out the top side of the bowl using a round-nose turning chisel. Sand and finish the bowl as desired. The bottom surface, on which the contact cement will be applied, should be left unfinished.

The strip of photos at left illustrate "tricks" that will help in making a project that combines wood and metal. Fig. 1: It is wise to have a template handy to check the outside contour of the wooden part of the project. In this case it is a wooden bowl. Fig. 2: If you study this picture carefully you will see the metal has started to bell back toward the turning tool. Do not permit this bending to go any farther than is humanly possible. Otherwise the metal may split when it is forced back to the chuck. Fig. 3: When setting the metal to chuck, start shaping it from the bottom to firmly anchor it in place. Fig. 4: During the metal spinning operation, periodical trimming of the circumference must be done as shown. Fig. 5: Use one part of sulfuric acid to 10 parts of water to remove oxide formed during annealing. Caution: Add acid to water!

The spun-metal base will not present any problems to the experienced metal spinner, and only a few to the beginner.

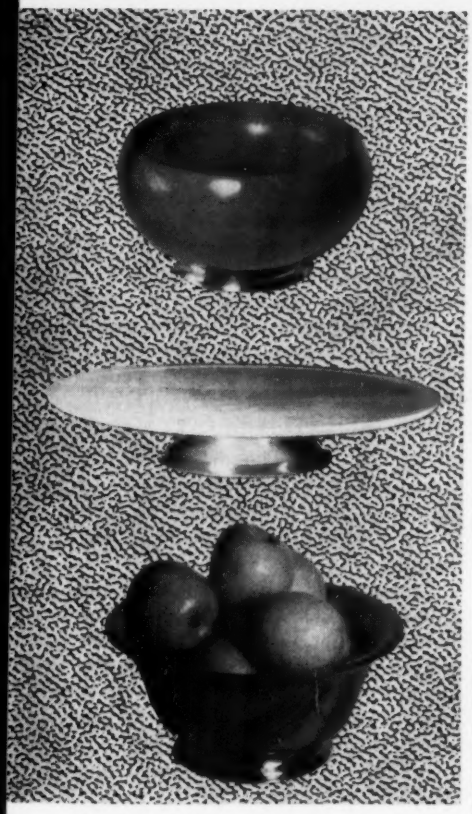
Spinning should be done only on a metal-turning lathe, or a good sturdy wood-turning lathe equipped with thrust bearings on the headstock. It is preferable to have a ball-bearing tailstock center.

The spinning setup that we used can be seen in the accompanying strip of photographs. The tool rest is homemade and can be adapted to your lathe. The wood chuck can be turned from a hard, close-grained wood such as maple or birch. The metal blank is held against it by the pressure from the tailstock center against a follow block. The follow block is approximately ¼" smaller in diameter than the base diameter of the chuck.

The metal blank should be lubricated with beeswax, tallow, soap, or stick wax. The metal is forced to the chuck gradually. Too much pressure will cause buckling and wrinkling.

Forming the metal causes it to harden and it is necessary to soften it by annealing. For copper and brass, the annealing can be done by heating it to a dull red and allowing it to cool by itself, cleaning off the oxide in an acid bath, and washing the metal in clear water. The spinning can then be continued. A deep spinning will require several annealings.

It is wise to trim the edge periodically during the spinning operation. This helps to keep the metal round. If the metal should be moved too much between annealings, it might wrinkle. Wrinkles can be removed easily by shaping it with a mallet over a stake. Wrinkles can also be removed on the lathe by using a back stick.



Both methods work equally well, once the metal has been annealed.

When the spinning is completed, remove the scratches from the metal with emery cloth and oil, or aluminum oxide paper and water. Follow this operation with a rubbing, using fine steel wool and oil. Next, buff the metal with Tripoli polishing compound; wash it in hot, soapy water, and dry it.

You can oxidize the metal before you lacquer, if you wish. A variety of colors—ranging from browns to blues to black—are possible with chemicals. One of the easiest chemicals to work with is potassium sulfide (K_2S). A warm solution of this chemical will impart the colors to the metal.

To fasten the parts together, follow the manufacturer's directions for using the contact cement. Apply the cement generously to both parts. Allow it to dry until all stickiness has disappeared. Align, carefully, the parts to be fastened together. Place them together. Press firmly. That's all there is to it. ★

[1]Manufacturers of contact cements that I have used successfully are: Elmer's Contact Cement, Borden Co., New York, N.Y.; Formica Fast Dry Contact Bond Cement, Formica Company, Cincinnati, Ohio; Weldwood Contact Cement, United States Plywood Corporation, New York, N. Y.

Teaching aid for the auto shop

Spark-Plug Diagnosis

By George R. Kinsler
LaCrosse, Wisconsin, School of Vocational Training

DO YOUR students continually make errors when diagnosing spark-plug problems? If so, here is a teaching aid that will be in front of them constantly as a reference. This aid is easily constructed. Materials needed are: one piece of hardboard, 30″ x 48″, and a set of nuts that will fit the type of plug selected for samples.

A typewriter with large type can be used for making out the cards identifying each plug and its problem; or your print shop can print the cards.

There are many uses for this aid. The aid shown in the accompanying picture was used in an education display in a local store window to promote interest in the school and its automotive shop. The aid also can be used for many levels of teaching, from general education to vocational education.

To collect plugs with a variety of problems, visit local auto dealers and service stations if your own shop does not have sufficient "business" to provide them.

A suggested list of examples of engine problems and solutions follows (the capital letter notations correspond to those in the photograph):

A. Two gaskets – careless installation.

B. Broken insulator – faulty plug, too hot a plug, or improper installation.

C. Carbon on insulator – internal leak in the plug.

D. Center electrode, excessive wear – check heat range, installation, or fuel mixture.

E. Soft, fluffy, dry carbon – check low-speed operation, or excessive idling, rich mixture, cold plug.

F. Red brown deposits – too long operation without service.

G. Hard black deposits – need hotter plug.

H. Wet black deposits–check rings, pistons, sticky valves, worn valve guides.

I. Cleaned – center electrode worn. Discard.

J. Cleaned – improperly filed electrode. Discard.

K. Cleaned–ground electrode worn. Discard.

L. Cleaned – file electrodes gap and a few additional thousand miles will be available.

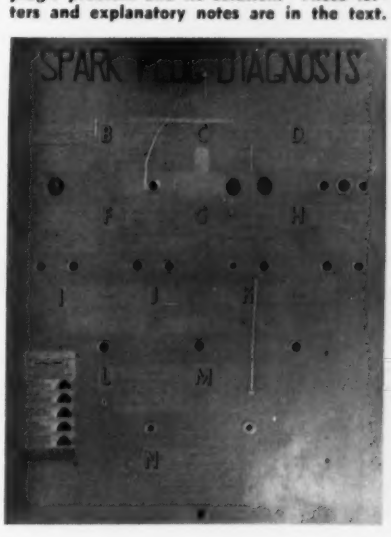
M. Cleaned – gap and use; a good plug for many miles.

N. New plug – this plug was taken from a scrap bin in a garage. It is very new. Perhaps changed to increase profit in the shop. Hard on the customer and fewer customers for the employer in the future.

In selecting your spark plugs, take into consideration where the aid is to be used. If it is in trade training one should have more complex problems and their implications from the set of plugs. If it is going to be used in general education, simple problems that can be readily understood should be selected.

This aid can be easily constructed. Your students can help you make it. Ask them to collect the plugs. This will give them a reason to visit garages and see first-hand the type of activity taking place there. ★

The spark-plug diagnosis teaching aid showing ends of spark plugs with a variety of problems. The letters on the teaching aid have adjacent to them, printed plainly, the plug's problem and its solution. These letters and explanatory notes are in the text.



It tells your shop story anywhere in the school

Roving Showcase

By Arthur F. Steiner

Robert A. Millikan High School, Long Beach, California

THE merits of industrial arts as part of general education are well established in the minds of students and teachers associated with the program in your school. The rest of the students and faculty, however, might still have reservations.

The use of a display case is not a new technique for intraschool public-relations. The display case described and shown here, however, has characteristics that have proved it to be a cut above many that we have seen and used in the past. First, it has some design virtues. These design virtues not only are eye catching but they demonstrate to discerning students and teachers that we are as concerned with "how" we do something in our industrial-arts classes as "what" we do. Second, the display case is portable. It can be spotted at strategic traffic spots in the school. The portability factor increases greatly the efficiency of the unit.

We believe, therefore, that this display case serves effectively its two-fold purpose: (1) It is a good advertising medium for the work done in our industrial-arts department; and (2) it helps attract students to the department.

The design of the display case offers maximum visibility to the viewer of its contents. The design also allows most typical shop projects to be displayed. It is large enough to hold fairly good-sized items made in our shops.

Project display is enhanced by the colorful mosaic panel. However, the panel can be removed to facilitate project displays, particularly of larger items. Cork and chalkboard – in addition to mosaic tile – are part of this panel. These two materials make the panel versatile because notices and explanatory material can be posted.

A recent display showing how industial-arts training contributes to a student's vocational objective of engineering was very well received. Other displays that have helped us to explain the contribution of industrial arts to general education are: (1) application of science and mathematics education in the industrial-arts shop; (2) a photographic display of the objectives, activities, and projects of each of the areas taught in our industrial-arts program; (3) displaying awards and honors won by our students; (4) posting bulletins and notices directed at industrial-arts students but also for the rest of the school community to read, thus "spreading the word" about what happens in our shops.

A portable showcase made of glass, angle iron, and wire mesh that can be spotted at strategic spots in your school.

The major cost of the portable display case is for the large 5/16" plate-glass panels. We were fortunate to locate two 4'x6' panes of glass at a local wrecking company. They cost $6 each. We also bought used wire mesh for $2. All told, the cost of our case came to slightly under $25. It was built in our metal shop by advanced students.

The construction procedure we used follows:

We started by cutting and bending the 1/8" x 1½" x 1½" angle iron and frames (allowing for contraction of

the welds at the corners so that they were square). We then welded the top and bottom horizontal angle-iron members to the end frames and cut the strap-iron floor supports and welded them in place.

The 2" iron pipe was then cut to size for correct leg assembly and they were welded to the angle-iron frame. The next construction step was to cut the wire mesh panels to correct size — one for the top and one panel for each end of the case. These two panels were spot welded to the angle-iron frame. The holes for the ¼" CRS pin hinges were located and drilled. The hinge pins were made and welded in place.

To make the door we cut the strap iron to size (the door should overlap the angle-iron frame by 1" on all sides) and welded the pieces of the door frame together — locating and welding in place the hinge cylinder (⅛" pipe). Cutting the wire mesh for the door frame and welding it in place completed the door.

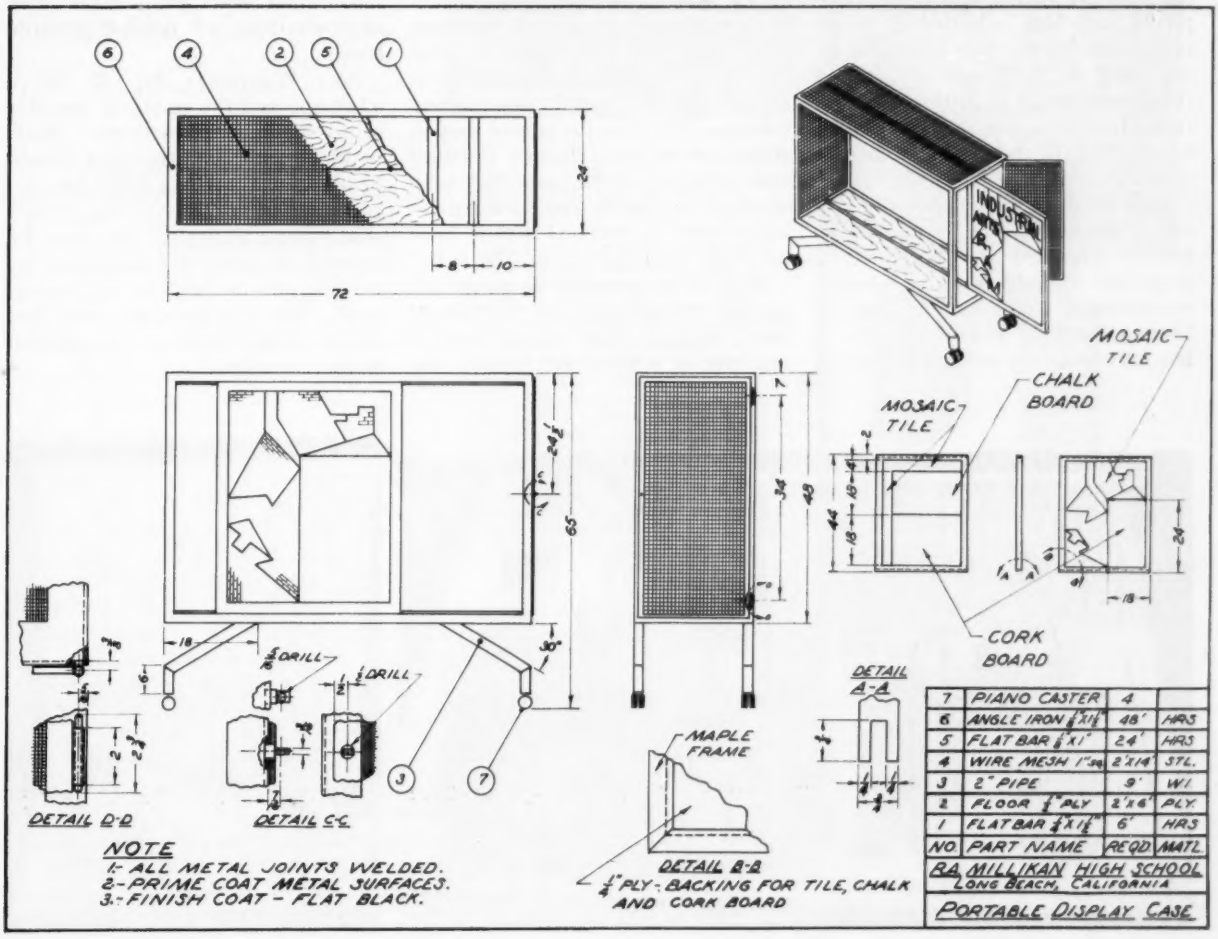
We used strap iron for the top center-panel guide, cutting and welding it in place. We cut ½" plywood for the floor and fastened it in the frame. On this floor we fastened the bottom center-panel guide. We attached casters to the leg members and a locking device to the door for the padlock.

We painted the entire case with flat, black paint. We also mounted the plate-glass panes on sponge rubber stripping (on both sides and ends). We secured the glass in place with hardwood strips, top and bottom.

We made the center panel by cutting 2" strips for the panel frame and mortised the insides of the frame members to accommodate the ¼" plywood panel. Next, we cut the slide groove on the top and bottom members of the panel to fit the guides at top and bottom inside the case. We glued the panel members together, sanded it, and applied a finish to the parts of the panel that would be exposed. We glued chalkboard and cork board to the plywood panel. Then we did the mosaic design, leaving the cork part of the panel exposed.

Appointment of a student committee to tend to the display, a drop or two of oil on the casters, and your industrial-arts department can start "public relationing" with this portable display case. A word of caution, though:

The case should be in the care of responsible students as there is a safety factor to consider with glass panes of this size. ★


MOSAIC TILE
CHALK BOARD
MOSAIC TILE
CORK BOARD
MAPLE FRAME
DETAIL A-A
DETAIL B-B
DETAIL D-D
DETAIL C-C
NOTE
1.- ALL METAL JOINTS WELDED.
2.- PRIME COAT METAL SURFACES.
3.- FINISH COAT - FLAT BLACK.
¼" PLY - BACKING FOR TILE, CHALK AND CORK BOARD
7 PIANO CASTER 4
6 ANGLE IRON 1"X1" 48' HRS
5 FLAT BAR ⅛"X1" 24' HRS
4 WIRE MESH 1"sq. 2'X14' STL.
3 2" PIPE 9' WI
2 FLOOR ¼" PLY 2'X6' PLY.
1 FLAT BAR ¼"X1" 6' HRS
NO. PART NAME REQD. MATL.
RA MILLIKAN HIGH SCHOOL LONG BEACH, CALIFORNIA
PORTABLE DISPLAY CASE

Because time is at a premium try

Modular Radio Construction

By Vincent C. McLean

Charles B. Gaskill Junior-High School, Niagara Falls, New York

WE maintain a growing file of various radio schematic diagrams cut out of a wide assortment of publications. Almost all of the diagrams are interesting but time does not permit actual assembly of all the schematics. A simple and effective solution was needed. Modular radio construction was the answer.

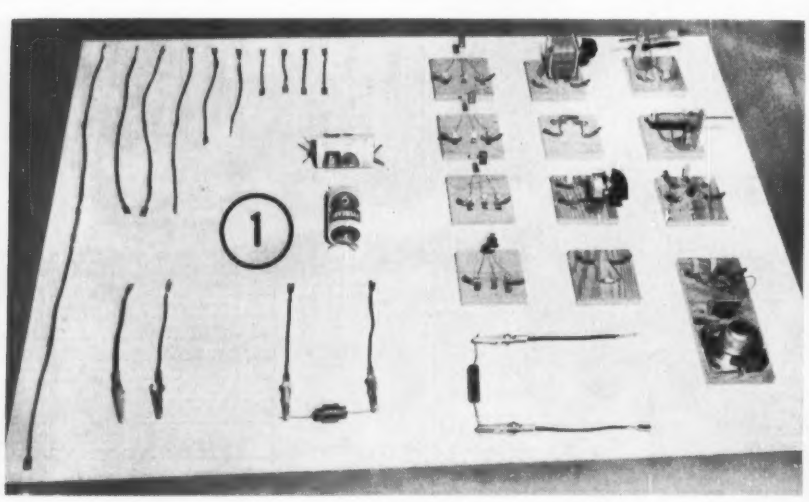
As illustrated (Fig. 1), a number of the most frequently used electronic components were selected and mounted on individual bases. When completed, each base indicated the proper symbol and the value of the part mounted on it. Originally, it was thought necessary to drill small holes in the bases to secure them to a bread board. Experience proved this unnecessary.

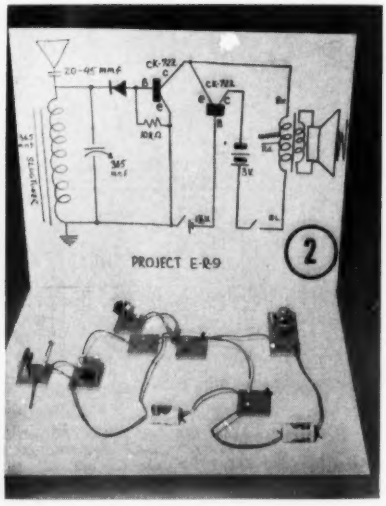
Establishing a wiring system to provide a secure contact as well as be readily connected and disconnected, presented a problem. The solution was found in a part made by Aircraft Marine Corp. of Harrisburg, Pa. It is a friction or slip-on clip, part number 42198-1. It was found that a strip of spring brass stock, .025" thick and 5/32" wide, provided an ideal matching member to the manufactured clip. The strips of brass were cut to varying lengths and a small hole drilled in either the center of the strip (for two terminals) or in one end. After the best mounting position was determined, leads from the mounted parts were soldered to the terminal strip. By placing one terminal over another, as many as three connection points were made, all secured to the base with one wood screw. Further connection points were made with terminals by joining several strips on one common lead. For the power supply, strips were soldered directly to either end of the dry cells. Again they were doubled to provide two terminals at either end. In this way either series or parallel wiring is possible.

Since it is impossible to mount all desired components to individual bases, alligator clips were secured to one end of a lead, the friction clip to the other. This system enables a student to insert components at will into almost any part of the circuit.

While this system is not a cure-all, it does work out rather well. Simple two- or three-transistor circuits can be set up and operating in minutes. With relative ease it is possible to experiment with varied values and components to determine optimum values. We have found that use of both capacitor and resistance substitution boxes are of great value in determining best possible performance.

Also illustrated (Fig. 2) are a schematic and the resulting assembly using modular construction. Note: In the assembly shown, 1½ v is used in place of 3 v and a 7500-ohm pot. was inserted in place of the 10,000-ohm resistor indicated. For those interested in trying this schematic, up to 9 v can be used in the second stage. This will provide more than ample volume from a 4" permanent magnet speaker. ★





News ABOUT TRAINING

The Technician

Critical Occupations

THE U. S. Department of Labor recently issued a list of critical occupations in which a shortage of workers exists or is developing which will significantly interfere with the effective function of essential industries or activities in this country.

Of the 32 critical occupations in the list, the following were selected as being of particular significance in the development of Title VIII training programs in the schools: electronic technician; engineer draftsman, designer; tool and die designer; production planners; technician occupations in engineering and physical sciences; and tool planners.

Tech-Ed in New York

NEW products, new materials, new industries, and new occupational patterns are involved in New York State's plan for training industrial technicians under Title VIII of the National Defense Education Act, according to Donn Billings of the New York Bureau of Trade and Technical Education.

Provision has been created for extending vocational education to youth and adults in areas of the state not now served, and for providing needed instruction in technical occupations important to national defense, he writes in *Viewpoints*.

The state plan specifies instructional programs, identifies national defense occupations, and sets minimum standards for facilities, curriculums, teacher qualifications, and other criterions. Local or area school administrators evaluate needs and propose courses which meet these standards. Department personnel provide consultative services in developing such area programs.

During the first year programs have been developed in six administrative units, including the Boards of Cooperative Educational Services in Erie County Districts 1 and 2, Suffolk County District 2, and Westchester County District 2, and in the local schools districts of Levittown and Olean. Specialized equipment has been installed for training in the fields of electricity, electronics, and machine design.

In addition to these six units, a survey has been conducted in the Syracuse area to determine needs for training technicians in various occupational fields.

Technical education is not new at the secondary level in New York, Mr. Billings points out. Nevertheless, a maximum effort has been made to pursue new policies and new patterns following trends now forecast for the training of technicians.

ECPD Accredits Three Programs

THE Subcommittee on Technical Institutes of the Engineers' Council for Professional Development accredited programs in technology at Arlington, Texas, State College; Erie County Technical Institute, Buffalo, N. Y.; and New York City Community College, Brooklyn, during the past year. At present 35 institutions offering 118 curriculums have been accredited by ECPD. Details of the programs and other materials on technician training will be found in the annual report of the ECPD, 29 West 39th St., New York 18, N. Y., which is available for $1.00. ★

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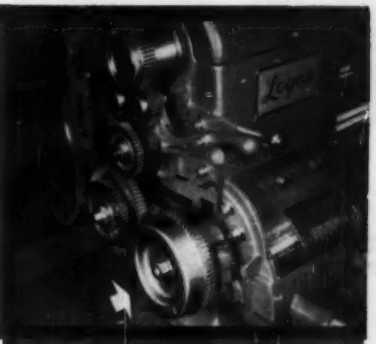
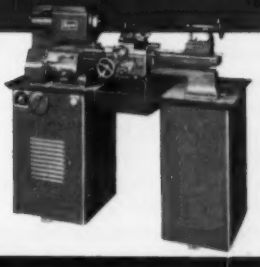


12" Lathe



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A student inspector all set to start work.

It works

Student Inspection Saves Teaching Time in Machine Shop

By George W. Cougher
Wichita, Kansas, High School East

THE idea that students can be taught to perform inspection duties and maintain quality control in a vocational machine shop may seem absurd to a journeyman machinist or a journeyman machine-shop inspector. But after experimenting two years with student machine-shop inspectors, the entire idea has proved very successful. At least, it is successful to the point that it saves the instructor hours of teaching time that would ordinarily be spent in checking production parts to maintain tolerance for interchangeability, or to determine if the parts can be salvaged or should be scrapped.

The vocational machine shop of Wichita, Kan., High School East has developed an inspection department of which it is proud. The machine-shop training program is taught at the tenth-, eleventh-, and twelfth-grade levels, but inspection is primarily taught during the twelfth grade. The methods used to operate the inspection department at East High can be summed up as follows:

1. The instructor must first create and build the department. If possible a corner or an adjoining room should be used. A place where the noise of machines can be held to a minimum is best.

2. Necessary equipment should include: precision surface table, precision square, tool cabinet, thread gages, height gage, hole gages, dial indicator, plug gages, combination set, micrometers, vernier caliper, and precision angle blocks.

(The department should have a blueprint file complete with every print used in the shop training and, if possible, be separate from the blueprints used by the shop. With a cabinet for "incoming" and "outgoing" inspection, the department is rather complete for high-school training.)

3. An inspection procedure must be followed closely to insure a smoothly operating inspection department. The shop is provided with inspection tags which are attached to the finished parts. The tags furnish such information as the name of the parts, the number of parts, and the name of the student who machined the parts.

4. After the inspection is completed, the inspector either accepts or rejects the parts. If rejected, the parts are either sent back for rework or they are scrapped. If accepted, the parts are sent to the next operation or stored on advice from the instructor.

5. To complete the inspection procedure, the inspector keeps a record on a form that provides such information as the name of the student who machined the parts, the date the parts were sent to inspection, the number of parts accepted, the number rejected, the disposition of parts. This record is maintained for future reference needed in assembly or for rework purposes.

The selection of student inspectors is important. They should be selected from students in their third year of machine-shop training. They should be boys with average, or better, knowledge of machine shop. A boy who can discipline himself and is something of a leader in his class has the qualities necessary to become an inspector. On the other hand, students who have a tendency to favor their friends and have not acquired a healthy respect for quality workmanship should not be encouraged to train for inspection.

The inspection training must be directed by the instructor. It is necessary that the student learn to use all precision tools, which includes taking tools from the case and replacing them, keeping all bright surfaces free from rust, and safety practices to prevent tools from falling to the floor. The student inspector should make set-ups that will enable him to decide if actual production parts are within tolerances. Blueprint reading is another phase of the training. He should know how to read and interpret plueprints.

The amount of time one student spends in the inspection department depends on the interest of the student and his ability to learn inspection procedures. It is not advisable to select a student for inspection training and expect to receive the best results any sooner than one semester. The best time to train the student would be during his entire senior year. "Robbing" the student of machine training must be considered. At East High the inspection department uses two inspectors per year.

The instructors admit that a department such as described above cannot be accomplished in a few days but will take planning and preparing for perhaps a year or more. One of the greatest values of the inspection department is the saving of teaching time. The teaching time saved cannot be measured accurately, but the experiment shows approximately three hours per week saved after the school work gets into full swing. ★

In Europe . . . . *from page 10*

They are equipping them with up-to-date equipment.

Should it not be possible in the United States to have buildings and equipment comparable to that found in Europe? Might our failure to provide more adequate facilities for trade and technical education be related to the fact that we are not working as closely with industry as we should? In communities where industry and education are cooperatively engaged in the process of determining needs and planning programs to meet these needs, there is also considerable support for adequate facilities to do the job.

8. Courses of study and curriculums in European trade and technical schools are carefully planned in considerable detail and are based on the requirements of the occupation for which training is provided. It is assumed that those responsible for planning trade and technical programs must know what are the competencies needed for a person to function successfully in a particular occupation, and that it is their responsibility to outline a program of instruction which will lead to the development of these competencies in the trainee. Consequently, a student's program of studies is made up largely of required courses, which in the opinion of qualified educators are necesary to develop the competencies required in a particular occupation. Furthermore, instructors are expected to follow detailed courses of study, which are sometimes prepared by the ministry of education, and in other cases prepared within a particular school.

Have we in the United States gone too far in permitting students to elect the courses they wish to take to achieve their vocational objectives? Should we not assume there is a hard core of required content which a student must master to qualify for work in a particular field; and, therefore, that there are certain prescribed courses which he must complete satisfactorily? This should not, however, eliminate the opportunity to elect certain courses, which are not directly related to his vocational objective, but which will help him round out his general education. Also, is it too much to ask that each instructor have written courses of study carefully planned?

9. In most European countries, 70 to 80 percent of the youth will have completed their full-time formal education at the end of the eighth grade, or at about 14 or 15 years of age. A high percentage of these boys and girls go into employment under an apprenticeship arrangement, which requires that they work five days with a qualified workman and attend school one day (nine hours) each week for a period of two to four years, depending on the trade or occupation to be learned.

To give you some idea of the magnitude of this apprenticeship program, let us compare Austria with Michigan. Austria has about 140,000 apprentices in training at any one time, while Michigan has about 10,000, even though the total populations are about equal. Youth in the United States are not only given the opportunity, but they are encouraged by parents and teachers to get at least 12 years of full-time schooling. In most states, school attendance is compulsory until 16 years of age. Also, our employment policies and practices make it virtually impossible for youth to find satisfactory employment before 18 years of age. Should all youth be encouraged to stay in school for 12 years or more?

Might it not be better for some youth to interrupt their schooling for the purpose of getting some on-the-job experience, which might point up the need for further education on a part-time basis? Or, for an increasing number of youth, might it not be appropriate to place them in cooperative training programs where work experience and education are combined?

The principles on which these European practices are based are well known to all vocational educators in the United States. Unfortunately for youth in the United States, we have not been as successful as European vocational educators in implementing these principles.

Just because an educational practice seems to serve well one or more European countries does *not necessarily* mean that it would be appropriate or effective in our country. However, European trade and technical schools have a well deserved reputation for turning out skilled craftsmen and competent technicians. Why not adopt those European practices which have been so successful in getting the job done? In this way, we might raise the quality of trade and technical education in the U. S. ★

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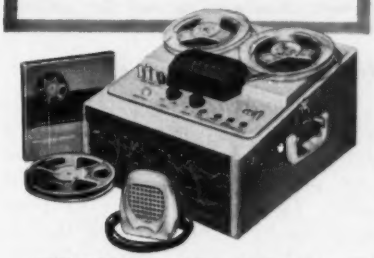

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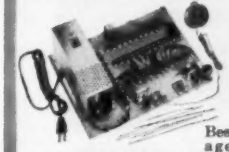

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KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

For Longer Sandpaper Life

The supply of sandpaper in the school shop will last longer if the strips are first backed with friction tape prior to sanding work on the lathe. This allows pupils to press down harder without tearing the paper, and the tape allows the paper to conform to the contours of the wood without premature buckling. — *Harry J. Miller, Sarasota, Fla.*

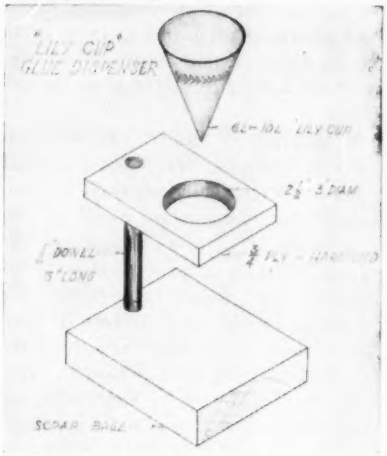
Crack Filler to Match

An excellent crack filler and nail-hole filler can be made by blending to the consistency of putty sawdust of the wood being worked with "white" glue. The result is a nearly identical color match. — *Robert C. Ielfield, Seroe, Colorado, Aruba, Dutch West Indies.*

Oil-Resistant Finish

For a fast-drying, durable, oil-resistant, and attractive finish for tool panels and other such fixtures in your shop, apply a coat or two of vinyl base paint of whatever color you wish. After the paint has dried, apply a coat or two of shellac on top of it. The shellac seals in the color and prevents the vinyl base paint from absorbing oil and foreign matter that would detract from the attractivenesss and use of your fixtures. —*Richard H. Snow, Tonalea Elementary School, Scottsdale, Ariz.*

Handy Mixing "Pots"



Tapered cups, such as those used in soda fountains, make fine mixing cups and dispensers for powdered glues. Fitted with a holder (above) they are neat and efficient for mixing and handling glues or other liquids in your shop.

This type of cup comes in 6L, 6-oz, or 10L, 10-oz. sizes and they are available from any restaurant supply house.

The holder can be made from scrap stock. Holes to hold the cup should be 2½" to 3" in diameter. One-half inch dowels are glued to the base block and cup holder to form the rack. The capacity of the holder can be increased by extending the cup shelf and adding more cup holders. A ½" dowel at each end of the rack will provide sufficient support. — *Ernest C. Carlson, Laytonville, Calif., High School.*

Correction: In the Kink appearing on page 26 of the March issue of SCHOOL SHOP under the heading "Difference in Scales," the Engineer's Scale and Chain Scale should have been noted as being one and the same scale. In the Architect's Scale, it should have read "Full scale: 1"=1'; Half scale: ½"=1'; Fourth scale: ¼"=1'; Eighth scale: ⅛"=1'."— *Editors.* ★

Photo above shows collector on shop roof and scrap discharge door in side of building. This unique system at the Carlisle Senior High School, Carlisle, Pa., accommodates all dust and scrap from the shop shown at right. All piping is below floor level under grating to best utilize all available working space, and to give the students maximum visibility and freedom of movement around machines.

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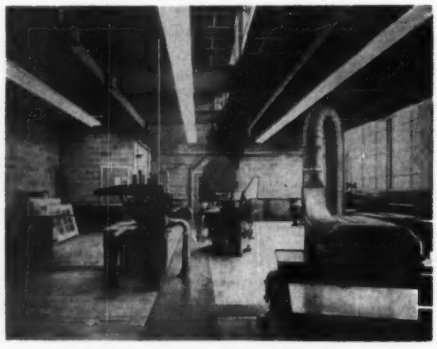

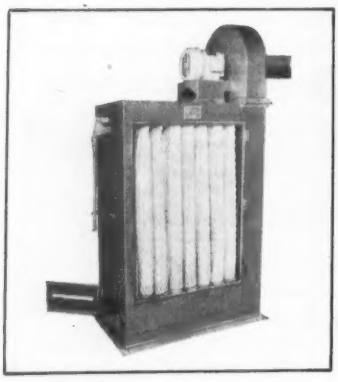

This OBP portable unit is complete with exhauster, motor and filter bags. Dust which is picked up from machines is deposited in a storage compartment and the clean air is returned to the shop.

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Newer techniques from industry

Chemical Milling

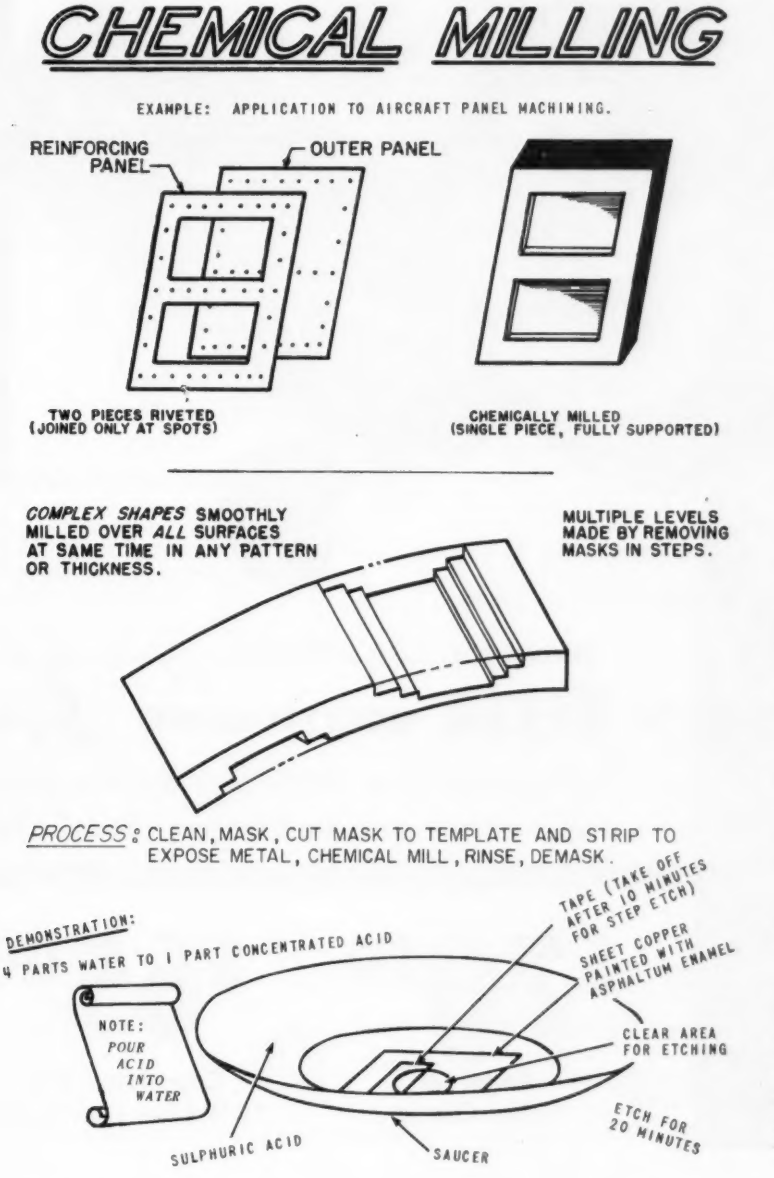
By John E. DeWald

Engineering Design Division, U. S. Army Ordnance Tank-Automotive Command, Detroit, Michigan, Arsenal; formerly Marysville, Michigan, High School

CHEMICAL MILLING is the opposite of electrodeposition. In other words, instead of *building up* a piece of metal to a desired shape by depositing more metal on the workpiece by an electro-chemical process, chemical milling *removes* metal from a workpiece, reducing its original size and shape to a *particular and desired* size and shape. Materials that are reported as successfully milled chemically are steel, aluminum, copper, brass, bronze, beryllium, and titanium. It is believed almost any materials except silver, gold, platinum, and lead can be milled chemically.[1]

An Explanation

This description of chemical milling is published in SCHOOL SHOP to acquaint teachers and students with a newer industrial technique that is not usually carried on in shop classes but is becoming more important in industry. You will note that a class demonstration is suggested at the bottom of the drawing so you can show your students how chemical milling is done.


CHEMICAL MILLING
EXAMPLE: APPLICATION TO AIRCRAFT PANEL MACHINING.
REINFORCING PANEL
OUTER PANEL
TWO PIECES RIVETED (JOINED ONLY AT SPOTS)
CHEMICALLY MILLED (SINGLE PIECE, FULLY SUPPORTED)
COMPLEX SHAPES SMOOTHLY MILLED OVER ALL SURFACES AT SAME TIME IN ANY PATTERN OR THICKNESS.
MULTIPLE LEVELS MADE BY REMOVING MASKS IN STEPS.
PROCESS: CLEAN, MASK, CUT MASK TO TEMPLATE AND STRIP TO EXPOSE METAL, CHEMICAL MILL, RINSE, DEMASK.
DEMONSTRATION:
4 PARTS WATER TO 1 PART CONCENTRATED ACID
NOTE: POUR ACID INTO WATER
SULPHURIC ACID
SAUCER
TAPE (TAKE OFF AFTER 10 MINUTES FOR STEP ETCH)
SHEET COPPER PAINTED WITH ASPHALTUM ENAMEL
CLEAR AREA FOR ETCHING
ETCH FOR 20 MINUTES

Examples of chemical milling are shown in the accompanying illustration. At the top (below the words "Chemical Milling") are examples of an aircraft panel. The drawing at left shows a conventional method of fabricating a panel by spot riveting a reinforcing panel to an outer panel. The drawing at right shows the same desired result achieved by chemical milling. The heavy, black border on two sides serves to illustrate (exaggerated, of course) that it is all one piece.

The third drawing under "Chemical Milling" illustrates other effects that are possible using this process.

Some advantages of chemical milling are:

1. The surface finish is improved because peaks are eaten off and rounded.
2. Tolerances are closely maintained — .003 is easily held.
3. There is no warpage or springback.
4. Uniform tapers are easily achieved by controlled immersion.
5. Work on both sides, all areas, and many parts is done simultaneously.
6. Experimental parts are milled without costly jigs or fixtures.

Some disadvantages are:

1. Parts must be chemically cleaned of lubricants, paint, etc.
2. Carbon steels have a hydrogen pickup characteristic which requires a heat treatment to remedy.

Design considerations that should be noted are:

1. Corners cannot be square.
2. End grain pitting lowers fatigue life.
3. Bosses and holes cause solution to swirl and increase eating rate locally.
4. Small areas and thin sections etch slowly because conduction of the heat from oxidation is less.
5. Inspection is easier because cracks and residual stresses cause etching differentials which show up visually. ★

---

[1] *Tool Engineers Handbook* (2nd ed.; New York: McGraw-Hill Book Co., Inc., 1959), p. 83-13.

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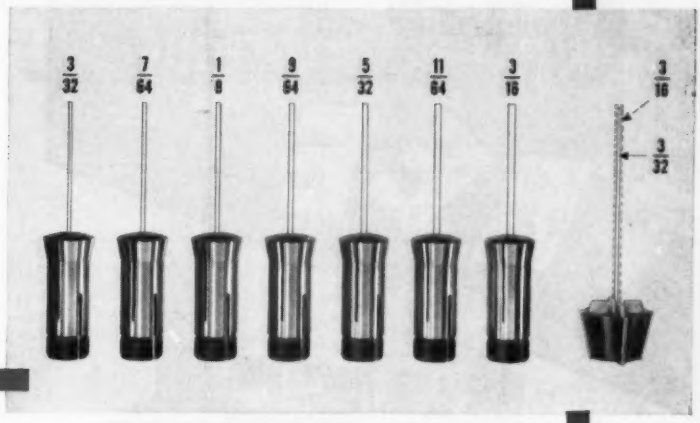
($6.50 each)



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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

Those Elusive Objectives

LET us pay homage to John Jones, the researcher. He seeketh not glory, nor doth he crave the plaudits of the multitude. He is dedicated to the task of revealing truth, and he careth not what the truth is about. He will attack with equal enthusiasm the problem of determining the number of flies per square inch in a given area, or the relative depths of the water in the Pacific ocean.

It is not surprising, therefore, that John recognized the existence of a problem when his friend Bill, who was an industrial-arts teacher, expressed an interest in the extent to which industrial-arts teachers used a course of study. Here was a challenge which stimulated John into making an effort to discover the facts related to the question.

We are not concerned with the procedure John followed in obtaining his data, nor do we propose to expand on the reams of statistics he compiled. However, it may be of interest to mention some of the conditions he found as he pursued the intricate task of segregating the facts.

He discovered that some teachers are of the opinion that most courses of study are merely theoretical outlines, which nobody follows anyway. Because of this they concluded that preparation of such a document is a waste of time.

Other teachers conceded they use a course of study, but one which exists only in their heads. They believed that by this means no one would know what they have in their minds, which makes it possible to change their plans without revealing to anyone that they are uncertain about where they are going.

Then there are some who prepared topical outlines which were so general in character that it was impossible for anyone but them to read between the lines. They are impressive documents, but they are useful only as exercises in typing.

Still others were proud to produce courses which they had prepared as one of the requirements in the teachers college they attended. Apparently it does not occur to them that these do not fit the conditions under which they are teaching. These courses had been graded "A" in college; therefore, they must be good. They were good, too, but only as examples of desirable procedure.

But John found that there are many teachers who had decided on their objectives and had mapped out, in detail, what they proposed to teach in order to reach these objectives. Most of these individuals were following their plans, they knew where they were going, and they had planned carefully what they considered to be the best routes to their goals. Moreover, anyone who is familiar with the subject covered could trace the routes from start to finish. However, there were a few who, while they claimed to have followed this practice, had filed them away so carefully that they were unable to produce them when asked to do so.

Unfortunately, too, the order in which the various principles were presented varied, with the result that if a pupil moved to another school he was apt to repeat what he had covered in his former school.

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This wide range of individual differences distressed John so he began to speculate on how to remedy the situation. After considerable thought on the matter, he came to the conclusion that if the teachers of each subject would get together and agree on what a course of study in their subjects should contain they could produce a plan which all could follow, and thus simplify the problem that appears when a pupil transfers from one school to another. As an alternative to this suggestion the supervisors might do the job and thrust it on the teachers. At least this latter scheme would provide the teachers with one more thing to gripe about.

John realized that some might claim that this was regimentation, but he pointed out that the teachers would still have the privilege of selecting their own problems and textbooks, and they could use whatever methods or illustrative devices they chose. John is a researcher, not a teacher, but looking at the problem as an outsider – perhaps he has something. ★

happenings in industrial education

Virginia Council

BASIL D. BROWDER, president of the Virginia Manufacturers Association, was scheduled to be principal speaker at the spring meeting of the Virginia Council of Industrial Education Clubs, being held April 23 in Lynchburg. Kent Clark of Danville Technical Institute, who is vice-president of the Council, was planning chairman for the event.

New Building at Trenton

A NEW industrial-arts building at Trenton State College, N.J., is one of the results to be obtained from the bond issue for higher education passed by the New Jersey voters last fall.

Plans for the new building are now on the drawing board. Sketches and equipment lists for the building have been completed by members of the college industrial-arts staff. To insure facilities reflecting the latest thinking in industrial arts, these sketches were sent to more than 50 national leaders for their reactions. In addition, R. M. Worthington, chairman of the industrial-arts department, and representatives of his staff inspected facilities at Pennsylvania State Teachers College, California: Ball State Teachers College, Muncie, Ind.: Indiana State College, Terre Haute: Purdue University, Lafayette, Ind.; Chicago Teachers College, Ill.; and Kent State University, Ohio.

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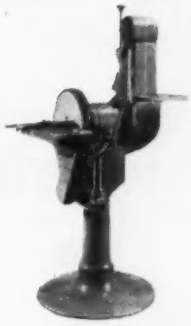

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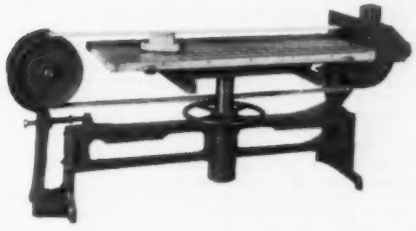

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Texas IE Conference

JOHN A. FUZAK, head of the industrial-education department, Michigan State University, East Lansing, was conference consultant and gave two addresses at the twelfth annual industrial-teacher conference held at the A & M College of Texas, College Station, in February.

More than 450 teachers, supervisors, and administrators representing the states of Texas, Arkansas, and Louisiana registered for the two-day meeting. The theme of the conference was "Industrial Arts and the New Age."

Dr. Fuzak spoke on "Where Are You Going – Up or Out?" and "Satellites, Shavings, and Sparks." Rogers L. Barton, chief consultant, Texas Education Agency, also spoke at one of the general sessions, his topic being, "Craftsmanship in Industrial Arts." Discussion of new processes and techniques in the various areas featured the group meetings.

Father and Son

THE HOUSTON, Tex., industrial-arts department now has the unique situation of having a father and son team –James R. Hunt and his son, Lynn R. Hunt. The elder Hunt, who has been with the school system many years, is teacher of mechanical drawing at Deady Junior-High School. The younger Hunt has recently entered the school system as teacher of woodworking at San Jacinto High School.

Changes Recommended

PROPOSED changes in standards for public-school programs in vocational education and industrial arts in Texas have been submitted by study committees appointed by the Texas State Board of Education.

The industrial-arts proposals include that a minimum of one-fifth of the students' time in class be devoted to theory, study, research, and similar activities, that class size be limited to 25 pupils, and that the teacher load be not more than 125 pupil periods in a six-period day or 150 pupil periods in a seven-period day.

Other proposals for industrial arts include the recommendation that 17 courses now approved be discontinued and that all industrial-arts courses be taught daily for 18 weeks minimum. Specific standards for buildings, equipment, tools, machines, and furniture are detailed in the recommendations.

The vocational industrial-education committee, among other proposals, recommended that maximum enrolment should be 40 students per unit and minimum enrolment should be 20 students per unit. The committee also recommended that vocational tests be made available and administered to students both early and at the time they are about to make decisions regarding the selection of vocational-education programs. At least one counselor who has had vocational-education or wage-earning experience should be employed by schools employing two or more counselors, it was proposed.

New Jersey Craftsman's Fair

THE third annual New Jersey Student Craftsman's Fair, sponsored by the New Jersey Vocational and Arts Association, will be held May 9-13 in the Newark Public Service Auditorium.

George W. Morgenroth, director of Essex County Vocational and Technical School, is chairman of the committee in charge of arrangements. Other members of the Association on

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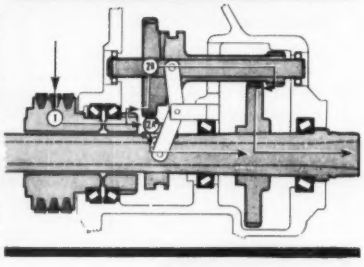

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the steering committee are: William M. Devonald, Richard O. Harthmann, Neil Perkins, Leonard J. Skolnick, and John J. Smith.

Foreign Visitors

WHEN foreign educators interested in industrial education visit the U.S., one of the secondary schools usually selected for inspection is the David Ranken, Jr., School of Mechanical Trades in St. Louis, Mo.

Recently educators from Greece and Russia were visitors at this school. The five educators from Greece included the head of the School of Home Economics and Trades, the assistant director of technical schools, the head of the chemical laboratories of the Greek State Railways, and two professors at vocational schools.

The Russian visitors were three vocational training experts. They were accompanied by Harry Brooks of the U.S. State Department and Gennadi Fursa, Soviet Embassy attaché.

Printing Scholarships

TWELVE scholarships valued at $200 each will be awarded this month to printing teachers who want to attend the Annual Conference on Printing Education, to be held Aug. 14-19 at the University of Houston, Texas.

The scholarships are provided by a grant from Elmer G. Voigt, Racine, Wis., president emeritus of the Education Council of the Graphic Arts Industry.

Virginia Officers

FRANK M. BREWSTER, director of vocational education, Norfolk County, is the new president of the Virginia Vocational Association.

Mrs. Eleanor Hamilton, area supervisor of distributive education for the Tidewater Area, is president-elect, and will succeed Mr. Brewster as president in December 1960. John Swann, director of vocational education, Lynchburg, is president of the T&I section, and vice-president of the VVA representing this group. ★

CONVENTION CALENDAR

American Society of Training Directors, St. Louis, Mo., May 2-6.
Industrial Arts Spring Conference, College of Education at Oswego, N.Y., May 5-6.
Connecticut Industrial Arts Association, Central Connecticut State College, New Britain, May 6-7.
Georgia Vocational Association, Atlanta Biltmore Hotel, Atlanta, June 9-10.
Colorado Vocational Association, Colorado State University, Fort Collins, June 13-17.
Conference on Printing Education, University of Houston, Tex., Aug. 14-19.
Louisiana Vocational Association, Monroe, Aug. 18-20.
Ohio Vocational Association, Southern Hotel, Columbus, Oct. 7-8.
Minnesota Vocational Association, Pick-Nicollet Hotel, Minneapolis, Oct. 20-21.
American Vocational Association, Los Angeles, Dec. 5-9.

*strictly personal

FRANCIS W. DALTON, professor of vocational education and practical arts at the University of Michigan, is retiring in June after 19 years on the faculty.

HOWARD M. HEIGL, former evening-school principal at the Vocational and Adult School, Racine, Wis., has joined the staff of the Wisconsin State Board of Vocational and Adult Education, Madison, as supervisor of technician-training programs under the National Defense Education Act.

GLENN STRONG of the staff of the Illinois State Department of Vocational Education, Springfield, died recently.

WILLIAM D. STONER, chairman of the department of industrial-arts education, Miami University, Oxford, Ohio, is retiring June 30 after serving on the faculty for 36 years.

HOWARD A. MATTHEWS, former director of vocational education and territorial commissioner for Alaska, has joined the staff of the Area Vocational Education Branch of the U. S. Office of Education, Washington, D. C.

VERNE C. FRYKLUND, president of Stout State College, Menomonie, Wis., has been named to membership on the Defense Advisory Committee on Education in the Armed Forces by the U. S. Department of Defense for a four-year term.

WALTER G. MENDENHALL has joined the faculty of the Technical Institute of William and Mary College in Norfolk. He previously taught at North Carolina State College.

B. R. TURNER, formerly superintendent of area trade schools, Columbia, S. C., is now technical supervisor and consultant of the area trade schools. M. B. ROBINSON, formerly assistant superintendent, has been named superintendent. ★

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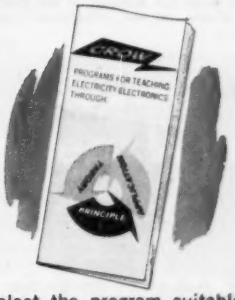

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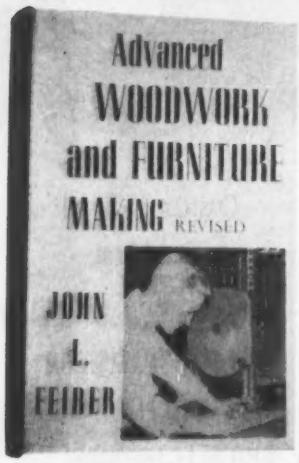

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Formica Fabrication. Hockaday. San Diego, Calif.: R. C. Hockaday, P. O. Box 6052, 1960. Pp. 60. $2.50.

This is a textbook for students and fabricators of decorative plastic laminates. It deals with the history, processes, costs, specifications, cores, adhesives, as well as a number of other pertinent areas.

It was written by a representative of the Formica company for use by the California vocational schools. It contains much that will be of interest to anyone who is concerned with this material and with its application.

Darwin's Automotive Accessories Repair Guide. Vol. 1. Mezo. Detroit, Mich.: Edward J. Mezo, 8532 Vanderbilt Ave., 1956. Pp. 106. $1.00.

Drawings, photographs, and diagrams in this book should help automotive-repair students understand the repair of automobile accessories ranging from air conditioners and autronic-eyes to windshield wipers.

All told, 12 different accessories are discussed in the volume. In some instances, such as air conditioning, the principle on which the accessory is based is discussed. Diagnosis helps are included.

Edward J. Mezo has written three other books in the automotive repair field.

Forney Arc Welding Manual. (Third Edition). Fort Collins, Colo.: Forney Manufacturing Co., 1958. Pp. 210. $2.50.

There is presented in this book a comprehensive course in the fundamentals of metal repair. The material presented includes instructions, practical working tips, selfteaching exercises, and questions and answers.

Information on the carbon arc torch includes brazing and welding, plus some suggestions for many unusual uses of the torch. The chapters on soldering techniques, made possible by the Forney combination repair unit, contain information on soldering aluminum and stainless steel.

The Automobile Electrical System. Barr and Flocco. Philadelphia: Chilton Co., 1960. Pp. xviii + 418. $7.95.

This book provides information and suggestions that should be helpful to the serviceman who must deal with numerous electrical problems that arise in the maintenance of the modern automobile. It deals with the various circuits used in a car. Separate chapters are devoted to lighting, ignition, generators, regulators, and starting motors. In each of these chapters numerous difficulties are discussed and suggestions are made in regard to removing the cause of the trouble.

Rudolph R. Barr and Thomas D. Flocco have had wide experience in the automotive field. They are on the staff of the Mastbaum Vocational-Technical School, Philadelphia

Industrial Arts Drafting. Walter and Plevyak. Chicago: Goodheart-Willcox Co., Inc., 1960. Pp. 208. $3.00.

This book covers a course in drafting. It is intended to meet the needs of beginning pupils in the junior- or senior-high school. The material is so presented that it may be used as a text in a six-, nine-, eighteen-, or thirty-six-week course.

The book is well illustrated. Numerous problems are included in geometrical drawing, auxiliary views, pictorial drawing, pattern development, charts and graphs, and architectural drawing. Teachers will find it to be a valuable aid in teaching beginners in this field.

John R. Walker is supervisor of industrial education, and Edward J. Plevyak is an instructor in drafting in the public schools of Bel Air, Maryland.

Primer of Lamps and Lighting. Allphin. Philadelphia: Chilton Co.—Book Division, 1959. Pp. xii+ 241. $10.00.

This book is designed primarily for use by people who are engaged in selling or distributing lamps and fixtures. However, it contains enough basic electrical information to make it valuable as a reference in schools where lighting is included in the course in electricity. It will be helpful also for the mechanic who is rusty on some of the theories of lighting.

Willard Allphin has been on the staff of the Sylvania Electric Products Company research in illumination, and is currently working on illuminating research.

Magnetism and Electromagnetism. Advanced Magnetism and Electromagnetism. Schure. New York: John F. Rider Publisher, Inc., 1959. Pp. 78 and 104, $1.80 and $2.25, respectively.

These two volumes are part of a series on electronic technology. The first of these deals with those aspects of the subject which underly the operation of communication and industrial-electronic devices. The purpose of the book is to give attention to the major

theoretical considerations on the intermediate level.

The second book is devoted to an explanation of the advanced concepts of the subject, and is intended to be a companion volume to the first. It introduces the reader to the most modern concepts of magnetism and electromagnetism in a lucid and understandable manner. It covers also such items as the cyclotron, the mass spectograph, and terrestrial magnetism.

Alexander Schure is on the editorial staff of the John Rider Company.

Machine Tool Operation. Part II. (Fourth Edition.) Burghardt, Axelrod, and Anderson. New York: McGraw-Hill Book Co., Inc., 1960. Pp. xiv + 681. $6.60.

In this edition, the chapters on metallurgy and hydraulics have been expanded to include the most modern machine tools that operate under hydraulic power. New chapters have been added on cutting fluids and metal-cutting band saws, and material has been added on cam milling. Many concrete examples of specific operations are given to inform the student concerning the correct method of doing and setting up each of them.

Harry D. Burghardt was formerly head of machine shop in Dickenson High School, Jersey City, N. J. Aaron Axelrod teaches shop mathematics and science in Bayonne, N. J., Technical High School. James Anderson teaches machine shop and is director of machine-shop training at the Kollsman Instrument Corporation.

Electronics Reference Data. Vol. 2. Indianapolis: Howard W. Sams & Co., Inc., 1959. Pp. v + 121. $2.50.

This is an anthology of outstanding articles which appeared in various issues of a publication distributed by the Aerovox Corporation. These articles were selected and categorized with the idea of covering a number of significant subjects. Each category includes articles on related subjects, arranged for easy reference.

Encyclopedia on Cathode-Ray Oscilloscopes and Their Uses. (Second Edition.) Rider and Uslan. New York: John F. Rider Publisher, Inc., 1959. Pp. xix + 1361. $21.75.

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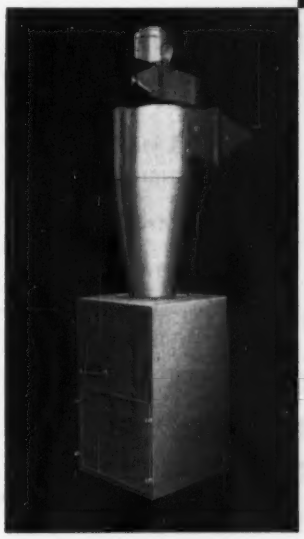

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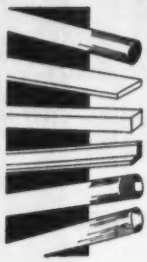

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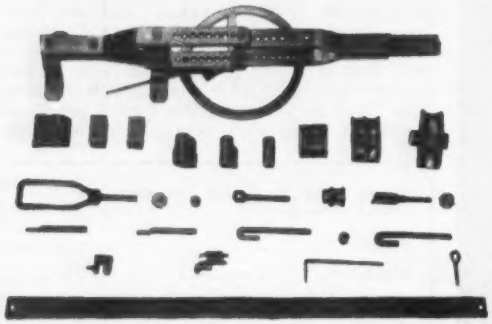

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It covers the latest in special-purpose, cathode-ray tubes, new data on probes, and related information on scope photography. New sections on pulse measurements and square-wave testing have been added. Every comprehensive library should have a copy on its shelves, and engineers who are concerned with electronics will find it to be an excellent reference.

Practical Shop Mathematics. (Fourth Edition). Wolfe and Phelps. New York: McGraw-Hill Book Co., Inc., 1959. Pp. xiv + 402. $4.50.

This is an excellent textbook for classroom use as well as for individual home study. It will serve as an effective reference book. Toolmakers, diemakers, machinists, draftsmen, and engineers will benefit from having a copy in their libraries.

In this fourth edition several new topics have been introduced, and some of the original topics have been expanded.

John H. Wolfe and Everett R. Phelps were formerly on the staff of the Ford Motor Company apprentice school, and, for many years, Mr. Phelps was professor of physics and astronomy at Wayne State University, Detroit.

Pamphlets:

Technical and Vocational Education in the U. S. A. is a 24-page bibliographical survey prepared by the U. S. Office of Education for Unesco. The booklet lists pamphlets and other publications on general vocational education, agricultural education, distributive education, home economics education, and trade and industrial education. Available for 75c from Unesco Publications Center, 801 Third Ave., New York 22, N. Y.

The Age of Reason for Color is a 20-page pamphlet written by Faber Birren. It is an appraisal of color in paper, printing, and the graphic arts. Available from Allied Chemical, 75 West St., New York 6, N. Y.

Trade and Industrial Education for the 1960's is a report of a National Conference on T&I Education, held in Kansas City, Mo., in 1959. This 89-page report is available by requesting Circular No. 607 from the U. S. Office of Education, Division of Vocational Education, Trade and Industrial Education Branch, Washington 25, D. C.

Foundry Facts; Metal Casting of Brass, Bronze, and Aluminum is a new leaflet prepared to supplement the guidance folder on **Metal Casting of Brass, Bronze, and Aluminum; Your Opportunities As a Trained Technician in the Foundry.** It has been prepared by the Crucible Manufacturers' Association to give more information on "the foundry as a place to work." Copies

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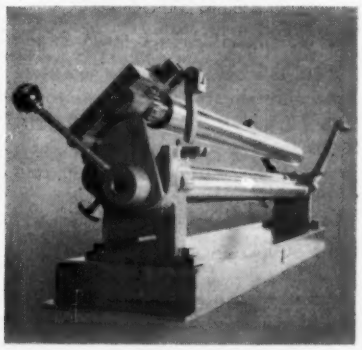

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of the leaflet and the folder are available free from the Association, 11 W. 42nd St., New York 36, N. Y.

Understanding Transistors; Allied's Handbook of Transistor Fundamentals by Milton S. Kiver is a 64-page handbook designed not only to serve as an introduction to transistors but also as a reference for those already acquainted with the subject. Available for 50c from Allied Radio Corporation, 100 N. Western Ave., Chicago 80, Ill.

Teaching Industry Through Production is a 29-page pamphlet written by George R. Keane of the City College of New York and published by the American Industrial Arts Association. It discusses the ways of organizing a class for the study of mass production and the values of such training. Available for 25c from the National Education Association, 1201 Sixteenth St., N.W., Washington 6, D. C.

Developing Educational Specifications for Vocational and Practical Arts Facilities is a 48-page pamphlet published by the American Vocational Association. The recommendations in planning for the needs of vocational education were prepared by a joint committee of the AVA and the American Institute of Architects. The pamphlet includes a discussion of desired spaces and educational programs, special site arrangement features, special physical aspects of building, and financial requirements for the project. Available for $1 from the AVA, 1010 Vermont Ave., N.W., Washington 5, D. C.

State Curriculum Guides for Industrial Arts, 1941-1958 is an annotated bibliography prepared by Marshall L. Schmitt, specialist for industrial arts, U. S. Office of Education. This 33-page publication may be obtained free by writing for Circular No. 567, Publications Inquiry Unit, U. S. Office of Education, Washington 25, D. C.

Audio Visuals:

Delco-Remy Training Aids, revised, is a listing of the training charts, chart manuals, handbooks, film kits, film booklets, and demonstration kit available from Delco-Remy. For a copy write Delco-Remy, Division of General Motors, Anderson, Ind.

It's Up to You is the title of a film on an eye-safety program in industry, recently released by Harvest Films in cooperation with the National Society for the Prevention of Blindness. The film, 16mm in color and sound, has a running time of 11 minutes. Available for rent or purchase from Harvest Films, 90 Riverside Dr., New York 24, N. Y., or from the National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N. Y.

Arc Welding Electrode Selection is a 25-minute, 16mm, color film that tells the basic factors which are important for correct electrode selection. It outlines a step-by-step procedure for base-metal identification, welding currents, welding positions, thickness and shape of base metal to be welded, etc. Reservations to show the film may be made by writing the Film Library, Hobart Brothers Co., Troy, Ohio.

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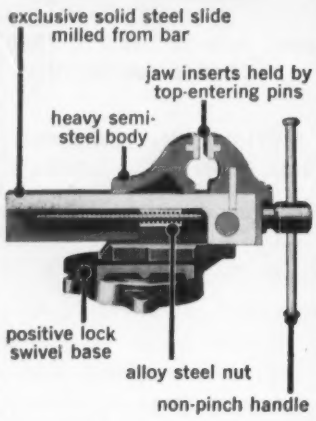
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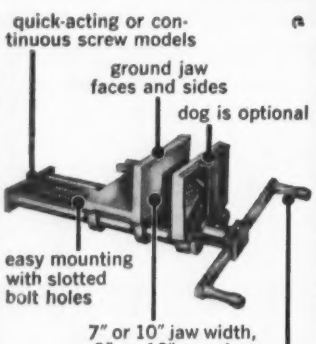
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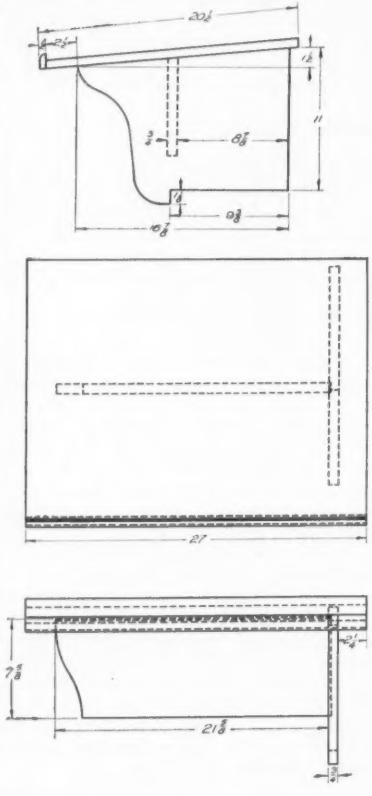

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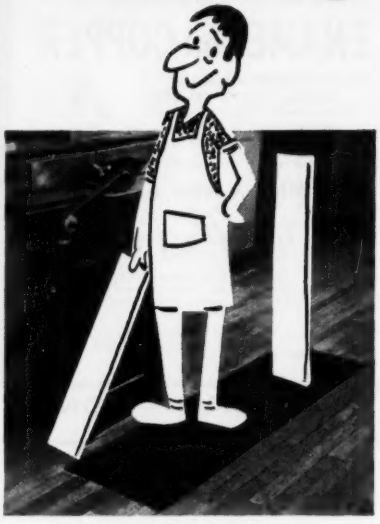

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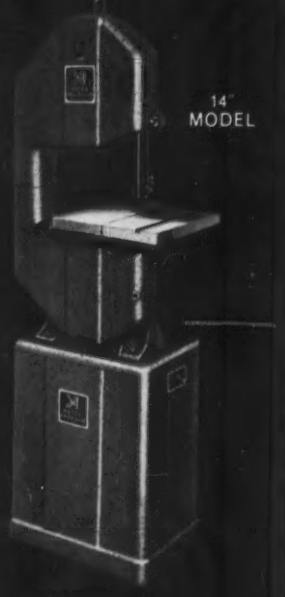

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news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

Watco Is New Type Oil Finish

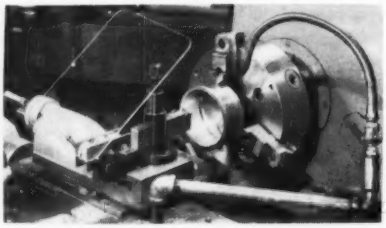
A new material for oil, flat, and Danish-type finishes has been announced by the Watco-Dennis Corporation.

Called Watco, the new finish is described by the manufacturer as an oil and resin polymerizing process within the wood itself. There is no surface coating or film to scratch or wear away, the company says. Wood units finished with Watco appear to have all the elegance of rubbed linseed oil, the manufacturer states, but there is no oily response to the touch. There is no necessity for sealers or multicoat steps in using Watco, the company adds. Watco is also said to be noninflammable and nontoxic.

For more information write the company, 1640 Twentieth St., Santa Monica, Calif., mentioning SCHOOL SHOP; or *circle no. M-1 on the business-reply card.*

Safety Magnetic Grip-Shield Offered by Dilley Mfg. Co.

The Dilley Manufacturing Company is now offering a Magnetic Grip-Shield for added safety in the machine shop.

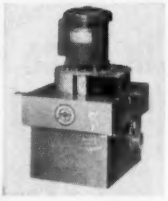


These handy, economical guards, the manufacturer states, may be gripped to the steel surface of various machine tools so they will deflect the missile-like chips safely into the machine beds away from the eyes and body of the machine operator.

The guards are available in shop-engineered sizes, with two powers of magnetic bases. The photograph above shows an 8" x 10" Giant-based Magnetic Grip-Shield on a precision lathe.

For more information write the company, 1647 Doan Ave., Cleveland, Ohio, mentioning SCHOOL SHOP; or *circle no. M-2 on the business-reply card.*

Small Dust Collector Introduced by Torit



A compact, low-cost dust collector said to be suitable for use in any light dust-producing operation is now being produced by Torit Manufacturing Company.

The new Model 301, which stands only 21½" high, occupies a space 12" x 14". Because of its small size, it can be located on or under work benches, the company reports. The dust collecting medium in the new model is an efficient, fire-resistant, throw-away glass filter, the company states.

For additional information write the company, 1133 Rankin St., St. Paul, Minn., mentioning SCHOOL SHOP; or *circle no. M-3 on the business-reply card.*

Foote-Burt Company Redesigns No. 2 Surface Grinder

The redesigned Foote-Burt-Hammond No. 2 surface grinder, recently announced by The Foote-Burt Company, has been developed specifically for fine grinding where accuracy and finish are important.

The company announces that improvements in the machine include the movement of the push-button station from the column to the front side of the base, where the operator can use it more conveniently without reaching over the table.

The table has a working surface of 6" x 18". In-and-out movement is 6½", and the longitudinal table travel is 18".

For more information write the company, Cleveland, Ohio, mentioning SCHOOL SHOP; or *circle no. M-4 on the business-reply card.*

Bubble-Goggles Offer Protection from Flying Particles, Sparks

Bubble-Goggles, manufactured by Paulson Manufacturing Corp., are now available to schools for shop use.

The Bubble-Goggle, the company reports, is all lens, contoured to fit the upper portion of the face and to guard nose, eyes, and forehead against flying particles and sparks. The lens is perforated to prevent fogging, the company adds, and a plastic frame surrounds the lens for protection against sharp edges. The lenses come in clear, light amber, light green, amber, and light blue.

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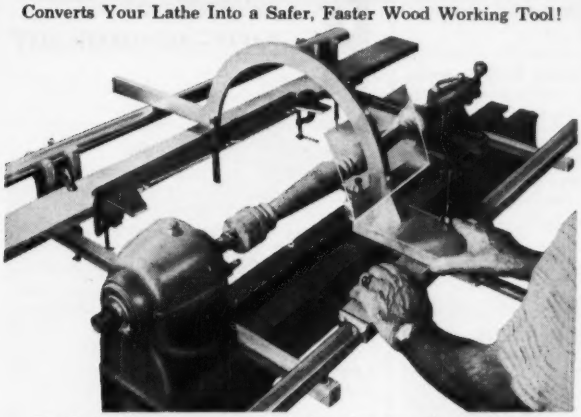

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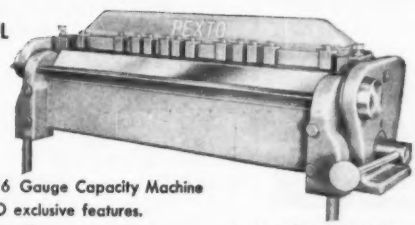

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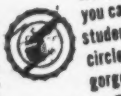

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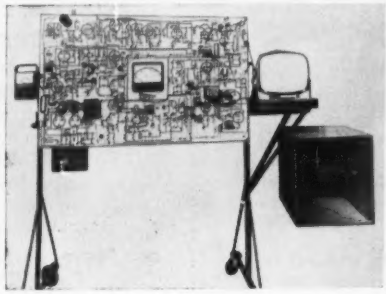
The Bubble-Goggle weighs less than half an ounce and can be worn comfortably over prescription glasses, the manufacturer states. It is designed for protection in such operations as grinding, metal finishing, wood and ceramic working, and other light shop operations.

For more information write the company, Fallbrook, Calif., mentioning SCHOOL SHOP; or *circle no. M-5 on the business-reply card.*

Electronic Teaching Aid for Classroom Demonstration

Classroom demonstrations to facilitate the teaching of electronic principles have been developed by Transvision, Inc.

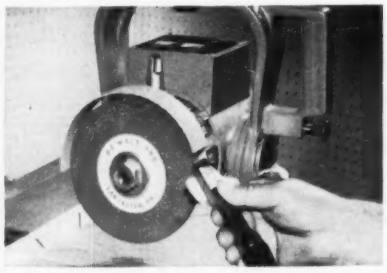


The electronic dynamic demonstrators are 3′ x 5′ circuit boards, displayed blackboard style. When completely assembled, they operate radio or television receivers superimposed on a large circuit diagram. Parts are connected or disconnected by a type of connecting device which requires no soldered joints. Terminal points are accessible for taking voltage and current readings, which are recorded on a large demonstration meter with readings visible to all students in the classroom, the manufacturer states. It adds that a high mobile stand is available on which the board may be mounted.

A teacher's manual accompanies the demonstrator to provide a course of study and lesson material.

For more information write the company, New Rochelle, N. Y., mentioning SCHOOL SHOP; or *circle no. M-6 on the business-reply* card.

New Safety Guard Kit Introduced by DeWalt



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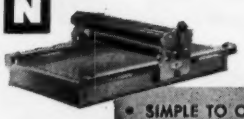

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diameter, and one for cup wheels up to 4" diameter — has been introduced by DeWalt Division of American Machine and Foundry Company.

The new safety guards can be used in a variety of grinding and buffing operations, the company points out. The guards fit over the desired wheel and are clamped to the motor end bell by using the motor stud and wing nut.

The complete kit consists of one guard bracket, two guard shrouds, one tool-rest assembly, and necessary hardware.

For more information write the company, Lancaster, Pa., mentioning SCHOOL SHOP; or *circle no. M-7 on the business-reply card.*

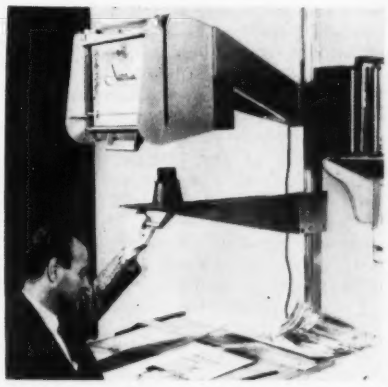
Two New UHU Glues

Two new glues have recently been added to the line of UHU glue products imported from West Germany and are being distributed in this country by Associated Hobby Manufacturers, Inc.

UHU-Hart is a glue for wood, balsa, and other nonresilient and nonporous surfaces, the distributor states. UHU-Plast is a glue for plastics and polyesterol, said to be especially suitable for plastic repair and model hobby work. Both of the new glues are hot-fuel proof, transparent, and fast-drying, the manufacturer states.

For more information write the distributor, 1240 Gilbert Road, Meadowbrook, Pa., mentioning SCHOOL SHOP; or *circle no. M-8 on the business-reply card.*

New Opaque Projector



A new opaque projector with a range of five-time reduction to five-time enlargement has been announced by Art-O-Graph.

The new Model 1000 Art-O-Graph gives a sharp, bright image of any photo, printed matter, or three-dimensional object directly on a drawing board, the company states. This means, the company says, that artwork can then be rendered in any medium on any surface from the projected image, with no intermediate steps necessary, such as tracings or photostats.

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4837 Emerson Ave., South, Minneapolis 8, Minn., mentioning SCHOOL SHOP; or *circle no. M-9 on the business-reply card.*

Heidrich-Nourse Markets Two Series of Impact Presses

Two series of Heidrick-Nourse pneumatic impact presses are now available for staking, riveting, upsetting, peening, force-assembling, and impression marking.

The company's VS series consists of single-acting or one-shot impact presses. The impact is adjustable from 100 pounds to 20,000, and remains uniform regardless of variation of work material, the manufacturer states. It adds that the tool must be in contact with the work before the hammer can be actuated.

The RH series are repeating hammer presses for uses requiring movement of the work material under the tool. Capacity claimed for this series ranges from gentle nudging to riveting ⅝" diameter in mild steel.

For more information write the Heidrich-Nourse Company, 633 E. Third St., Los Angeles 13, Calif., mentioning SCHOOL SHOP; or *circle no. M-10 on the business-reply card.*

Stanley Introduces New Line of Utility Vises with Swivel Jaws

A new line of Stanley-Yankee utility vises, said to be built for all-around use on bench or machine in school shops, has been announced by Stanley Tools, division of The Stanley Works, New Britain, Conn.

The vises are designed for use on drill presses, milling machines, grinders, and other machines, the company states, pointing out that features include exclusive removable swivel jaws for holding tapered and irregular shapes firmly.

Two new angle vises, the company says, can be adjusted to a full 90° angle or used as ordinary vises when in a horizontal position. A third model is the swivel vise in two sizes. A cam-lever clamp and plate assures positive lock at any position, the manufacturer declares. And the new swivel-tilt vises combine swivel base and angle base for compound-angle set-ups. The company states the cam-level clamp and plate also makes it possible to adjust this vise instantly while retaining the swivel feature.

For more information write the company, 111 Elm St., New Britain, Conn., mentioning SCHOOL SHOP; or *circle no. M-11 on the business-reply card.*

Vapor-Action Conditioners Now Can Be Used for Epoxies

The protection of brushes and spray guns used in epoxies is a new application of the Vapor Action Conditioners made by Wisconsin Laboratories, the company reports.

The manufacturer states that brushes and spray guns used in epoxies — the new plastics used as coatings, adhesives, and in molding — can now be protected by the same vapor action which keeps ordinary coating and finishing materials soft in brushes.

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New Literature:

Mico Engravers are described in a four-page folder recently issued by Mico Instrument Company. The folder also describes the Mico cutter grinder designed to grind all types of engraving cutters. For a copy of the folder write to the company, 80 Trowbridge St., Cambridge, Mass., mentioning SCHOOL SHOP; or *circle no. M-13 on the business-reply card.*

Care and Treatment of Parent Wood Tops is the title of a new four-page booklet released by Parent Metal Products, which shows how atmospheric and weather conditions can affect wood tops and how to overcome these natural deficiencies. For a copy write the company, 6801 State Road, Philadelphia 35, Pa., mentioning SCHOOL SHOP; or *circle no. M-14 on the business-reply card.*

Electrical Supplies, Wholesale Catalog 24 is a new publication of Rogers Supply House, listing heating elements, tools, testing equipment, and appliance servicemen's needs. For a copy write the company, 4214 N. Milwaukee Ave., Chicago 41, Ill., mentioning SCHOOL SHOP; or *circle no. M-15 on the business-reply card.*

Giles & Kendall Price-List Catalog illustrates in its 24 pages the do-it-yourself projects available from the company. Included are gun racks, stools, chests, assorted tables, bedroom suites, archery kits, water skis, etc. For a copy write the company, Huntsville, Ala., mentioning SCHOOL SHOP; or *circle no. M-16 on the business-reply card.*

Nails is a new 36-page nail manual offered by Northwestern Steel and Wire Company. It contains such useful information as count per pound, gage, length, and identification of 64 styles of nails. It also illustrates 27 common types of heads and points. Also available is a 9½" x 16" nail chart illustrating 44 types of nails. For copies write the advertising department of the company, Sterling, Ill., mentioning SCHOOL SHOP; or *circle no. M-17 on the business-reply card.*

Catalog EW-211 is a new 16-page supply catalog giving information on the complete line of Hobart arc-welding accessories and supplies. Included in the catalog are head shields, grinding shields, goggles, cleaning tools, electrode holders, cable connectors, ground clamps, work-holding clamps, welding cable, protective clothing, welding gloves, and miscellaneous equipment. For a copy write Hobart Brothers Co., Troy, Ohio, mentioning SCHOOL SHOP; or *circle no. M 18 on the business-reply card.* ★

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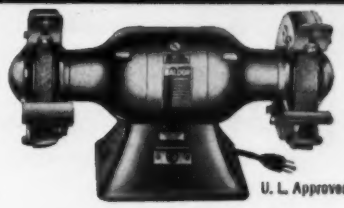

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Designing . . . . *from page 13*

6. Make working drawings.
7. Experiment with materials.
8. Seek information from technical references on such items as ways to fasten table legs.
9. Discuss ideas with peers, teacher, parents.

Final Solution

The better tentative solutions should be evaluated by the student or group using the adopted criterions. Further modification may result through compromise and combining of ideas. A valuable activity for testing the function and appearance of tentative and final solutions is model making. A scale model gives the designer a three-dimensional look into problems concerning size, shape, materials, construction, and finishes. This type of preliminary experimentation may prevent costly errors. Seeking the constructive criticism of students and others can be a valuable aid in arriving at the final solution.

The solution can be summarized in the form of working drawings, pictorial renderings, and a list of materials.

Construct the Solution

The construction phase is studded with independent problem situations which are less abstract and full of challenge. Considering ways to join two pieces together or the best method for cutting a complex angle are typical problems in which students may be involved.

Generally speaking, the instructor will know the operations and related information which should be made available to the group because of the original planning and his knowledge of student experience and ability. Other special instructional needs can be cared for individually and as the need arises. Meeting these needs which arise from variations in solutions is an exciting challenge of industrial-arts teaching.

Evaluate the Completed Solution

Not until the book support is complete can the solution be fully tested and evaluated. Actual use will help to provide some basis for evaluation. How well does it answer each of the criterions defined in the analysis? Also, it is very important that the student play the major role in the evaluation of the solution to the problem.

Some ways in which the student can be involved are; (*a*) group discussion of the solution; (*b*) teacher-student conference; (*c*) parent-student discussion; (*d*) student examinations of his completed solution in light of each of the criterions; (*e*) student answering orally or in writing a list of specific questions designed to sharpen the evaluation.

Some of these questions are:

1. How well were each of the defined criterions answered?
2. Where does the solution fall short?
3. What could be done to improve the shortcomings?
4. What resources were most helpful in formulating a solution?
5. Why did you choose this solution over the others you considered?
6. What changes in design did you make during construction? Why?
7. Is the function of your solution apparent?
8. How could more appropriate materials and processes have been used?
9. Can the materials be visually identified?
10. Does the craftsmanship enhance the solution?
11. Does the solution fit into its surroundings?
12. What were the most important things that you learned?

It should be stressed that this procedure may be planned in a variety of ways. A very productive variation could be that of having a group, through cooperative effort, come up with one final solution which could then be mass produced. Group quantity-production activities create a whole new set of problems in the area of social relationships and industrial techniques which can be successfully and profitably solved in an industrial-arts situation.

Problem-solving activities should begin early in industrial-arts classes. It is not necessary for students and teachers to know all the operations in a given area before becoming involved in a problem-solving activity such as suggested here. By careful planning, problem solving can be started with beginning students.

The industrial-arts teacher has a unique opportunity and responsibility to capitalize on the full potential of the laboratory situation by conducting guided experiences in problem solving, thus turning out an improved product, a clearer thinking American citizen. ★

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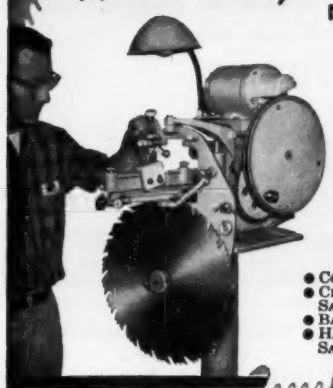

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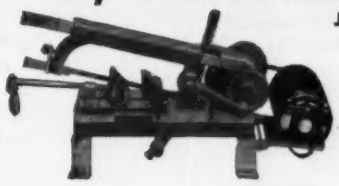

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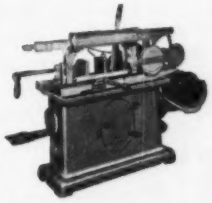

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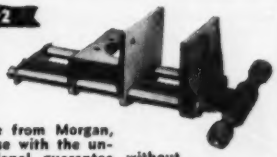

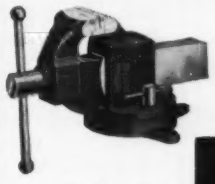

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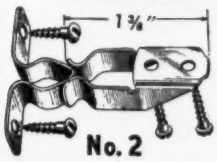

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Washington . . . . *from page 48*

dominant. That is, psychologists, sociologists, business and labor leaders, church and school workers — all joined in a search for the solutions to the problems which trouble the society of children and the society of adults. As for the "prescription of actions" the 7,000 participants wrote at the end of the conference, that is a subject for a later story.

No Thimblerig.—The federal budget for 1961, you will recall, proposed a bit of legerdemain. Let's cut $2,000,000 from the George-Barden appropriations, the budget-makers said, and let's push over $2,000,000 to the area vocational programs. The reason was not clear, but had something to do with the belief among budget-makers that there is less need for the traditional vocational training and more for high-skilled technical training.

Vocational educators didn't like the first half of this proposal and said so before the House subcommittee on appropriations headed by Rep. John E. Fogarty (D., R. I.). Representatives from the AVA told the subcommittee that its members are "unalterably opposed" to the proposed $2,000,000 cut. Actually, not much argument was needed to persuade the Fogarty group that the cut was untimely and harmful and that state and local officials cannot now replace the reduction in funds. Members of the subcommittee almost prompted witnesses to make statements to that effect.

Note, now, that educators kept mum about the second half of the budget proposal. Their attitude was: If the Administration wants to add $2,000,000 to the area vocational programs budget, that's OK with us and nothing needs to be said about it.

This strategy appeared to be successful. Although this is written before either the House or Senate Appropriations Committees acted, there is every indication that (1) the $2,000,000 will be restored to the George-Barden funds, and that (2) the additional $2,000,000 will be approved for the area vocational programs. This incident may teach budget-makers one thing: You can't play thimblerig with vocational money.

Safety Problems — Educators and education's point of view were very much in evidence at the President's Conference on Occupational Safety

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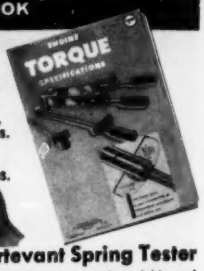

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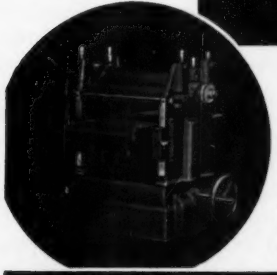

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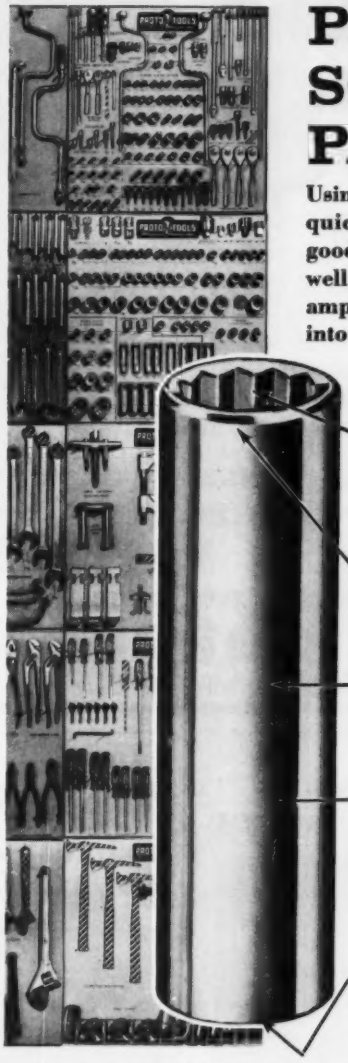

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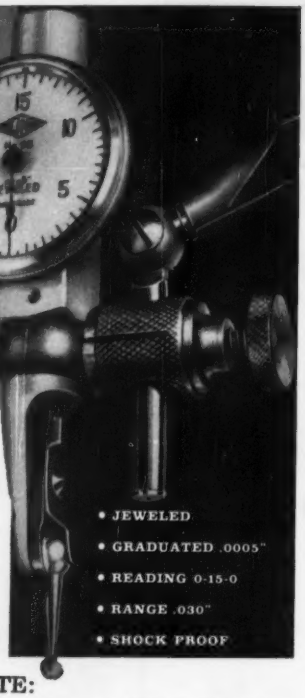

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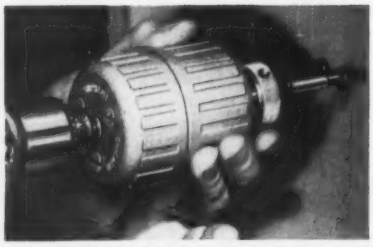

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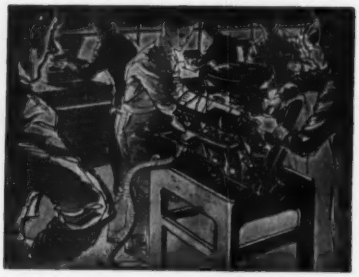

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held in Washington March 1, 2, and 3. But equally noteworthy was that industry, labor, government, and safety officials who were present recognized the big roles that schoolmen have in developing safety-conscious young workers.

The conference ranged over the wide, wide world of work, the changing nature of the work force, the changing nature of jobs, and the unchanging nature of man. We fly machines with incredible speed, but it has always taken the human eye one-fifth of a second to respond to a new stimulation, and probably always will. An ancient Egyptian toiler responded as rapidly to a stimulus as a modern jet pilot today responds to a stimulus on the dial in front of him, one speaker said.

Other speakers explored the hazards of noise, chemicals, and radiation; the psychological reasons for accidents; the effects seasons and business cycles have on accidents. Secretary of Labor Mitchell said that the automated factory may present a new type of hazard – boredom – "and how is one to prevent boredom from becoming dangerous?"

Where do the schools come in? Is it enough for the school-shop teacher to run a safe shop? Keeping shops safe is one important assignment for the teacher. But there is a greater challenge to schools for safety in this changing world. This challenge was neatly stated for educators by Earle S. Hannaford, a safety engineer for the American Telephone and Telegraph Company. He said that industry wants schools (and colleges) to provide graduates who have good attitudes toward safety "derived from actual living and working practices in safe school shops." Industry wants graduates who know and appreciate that safety will be required of them when they take a job in industry. In fact, Dr. Hannaford suggested that safety is a skill – and is to be prized as much as any other technical or occupational skill. And industry wants graduates who have a record of good, safe, accident-free performance in all school work, including, of course, shop work, Dr. Hannaford went on to say. Finally, he said, industry wants graduates who have had teachers with an intense interest in safety and who integrate safety practices and information into all phases of the student's work and activities.

After the conference was over, we began asking some of the chief par-

ticipants what they thought was the main achievement of the meeting. We were told that the practical result lay in this: that large segments of labor, industry, and the safety movement have now moved closer to a commitment to work with schools for greater safety consciousness. The prize exhibit here is the American Society of Safety Engineers, whose 70 chapters are said to be ready to cooperate with state and local agencies for greater safety consciousness.

An obligation has also been placed on the U. S. Office of Education. Panelists representing management, labor, safety engineering, and educators endorsed — or rather, re-endorsed because similar proposals had been made earlier — the suggestion that the U. S. Commissioner of Education set up a national steering committee to promote and channel efforts designed to keep the safety consciousness alive in school activities, especially vocational and industrial-arts programs. The U. S. Commissioner of Education was also reminded that it is high time to appoint a specialist in safety education to his staff to coordinate the work of the long overdue national steering committee. Said one Washington official: "We believe the Commissioner got the message." ★

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from Washington

by Michael Paca

Three Splashes. – Three items made splashy news during the month. Let's pick these off the top in short order so that we may next dig down to items which, though less spectacular, are just as fundamental.

First, there was the never-ending question of federal aid to education. Several weeks ago, friends of federal aid were elated, and its foes depressed, because the Senate passed a whopping bill authorizing grants for both school construction and teacher salaries. Now both friends and foes were in a state of watchful waiting. The odds favor the enemies of federal aid because the House is less eager to act than was the Senate. True, the House subcommittee on education has approved a bill and has sent it on to the full Committee on Education and Labor. But it has been stuck there while its members are said to be "perfecting the language of the bill." The language of the bill as it was received by the full committee authorized school construction grants only, but even this was too much for Chairman Graham Barden (D., N. C.). It is he who is said to be soured on the measure (as, indeed, he has been on similar measures in past years) and is conducting a one-man silent filibuster on it. He simply refuses to move it on. The next destination of the federal-aid bill is the Rules Committee – still another formidable barrier. Time is running out on the bill – and that's what Mr. Barden and others who oppose it are counting on.

Another top news story in March was the historic battle in the Senate and House on what newspapers called "civil rights." Actually, the agonizing and long-drawn-out debate in the Senate and the shorter dramatic fight in the House were concerned not so much with civil rights as with rights to schooling because the liberal bloc in the Senate wanted Congress to endorse the U. S. Supreme Court desegregation ruling of 1954. The liberals also wanted additional power for the Justice Department to speed integration. This, southerners in both houses refused to grant. Their determination won out. Nearly all of the sections dealing with education have been cut out of the civil-rights measure (originally four of the seven sections dealt with schooling). If the long and painful civil-rights battle proved anything, it was this: that Congress is divided into two powerful forces of almost equal strength – one believing that the way to full citizenship is through education; the other force opposing such a doctrine for a hundred reasons of its own.

For the third top item of the month, we leave Capitol Hill and go down Pennsylvania Avenue a half mile to the offices of the White House Conference on Education and Youth. Huge posters here proclaimed the event of the decade. On March 27 to April 2, some 7,000 men and women arrived in Washington for the 1960 ("golden anniversary") conference called by the President for a study of children in a changing world. The task before the conference was to write prescriptions for action which would "promote opportunities for children to achieve their fullest potential." The conference leaders believed there were many obstacles to such a goal and it took them no time at all to list off many of them. Thus:

There are many broken homes. Births out of wedlock are increasing. Juvenile delinquency is still rising. Classroom and teacher shortages persist. Children working on farm jobs are below grade in school. Unemployment is highest for young workers and those with least schooling. Many children have poor diets. Teen-age marriages are on the rise. Employers look for workers with higher-than-ever skills.

The picture isn't all gloomy and each of the above negative forces can be matched by a positive one. But the big point is that the world is changing at a rapid pace. Unless Americans have vision and couple it with action, children, youth, and the next generation of citizens will suffer.

In the past, White House Conferences on Children and Youth have been dominated by social workers, pediatricians, or reformers. This was not so during the 1960 meeting. The "interdisciplinary approach" was

(Continued on page 44)

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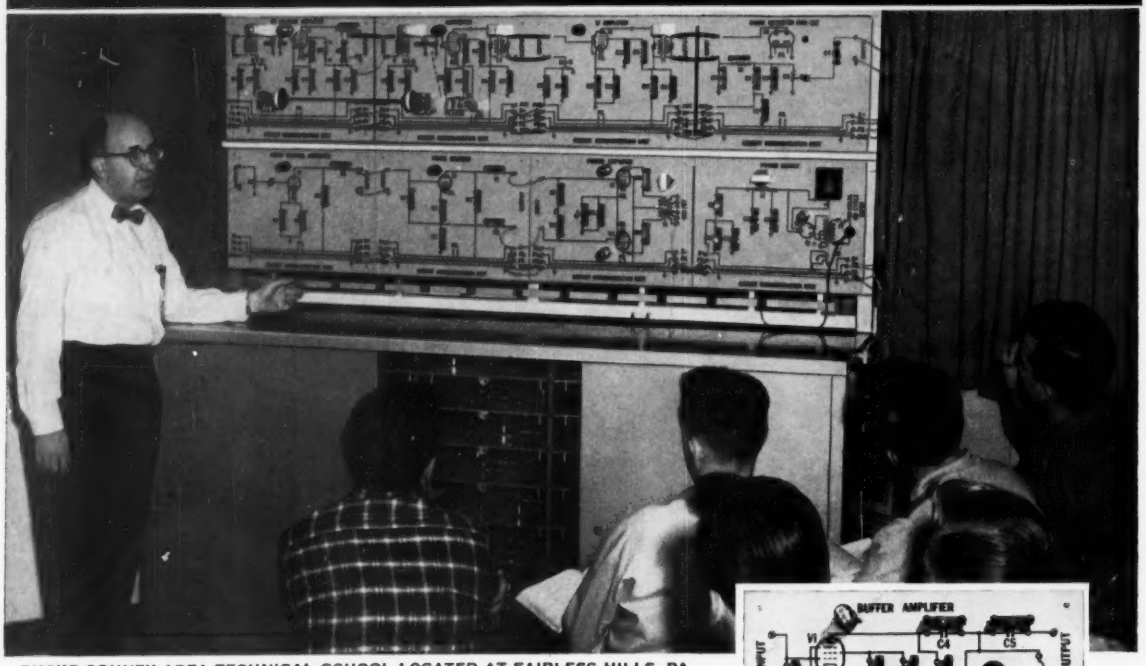

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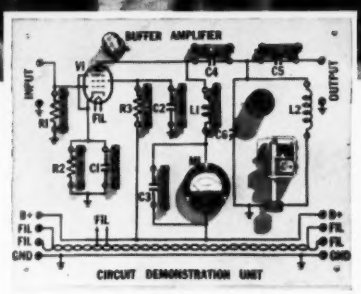
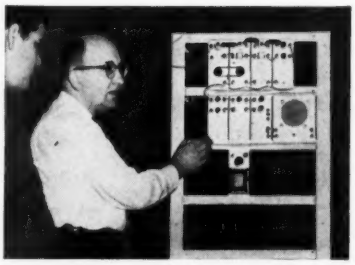
Classroom demonstrations, laboratory experiments and tests are completely organized for the teacher in the instructor's manual . . . and all are correlated with the text book. Students' workbooks provide direction and guidance.

The console houses as many as 40 different "building block" panels in its cabinet base. Entire console unit moves easily on its own casters and plugs into any regular A.C. outlet. No building modifications needed.

A variety of one, two and three year programs geared to modern technologies are available. Programs can be tailored to suit the specific training needs of any school or community.



Building Block Circuit Panel—Each is a basic circuit . . . function and relationship to entire system are easily explained as it is added on the demonstrator.



Matching Lab Units—For each "building block" circuit panel there is a matching lab chassis, a complete and operating counterpart unit for laboratory experimentation.

For further information, please write:

PHILCO® TECHREP Division

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